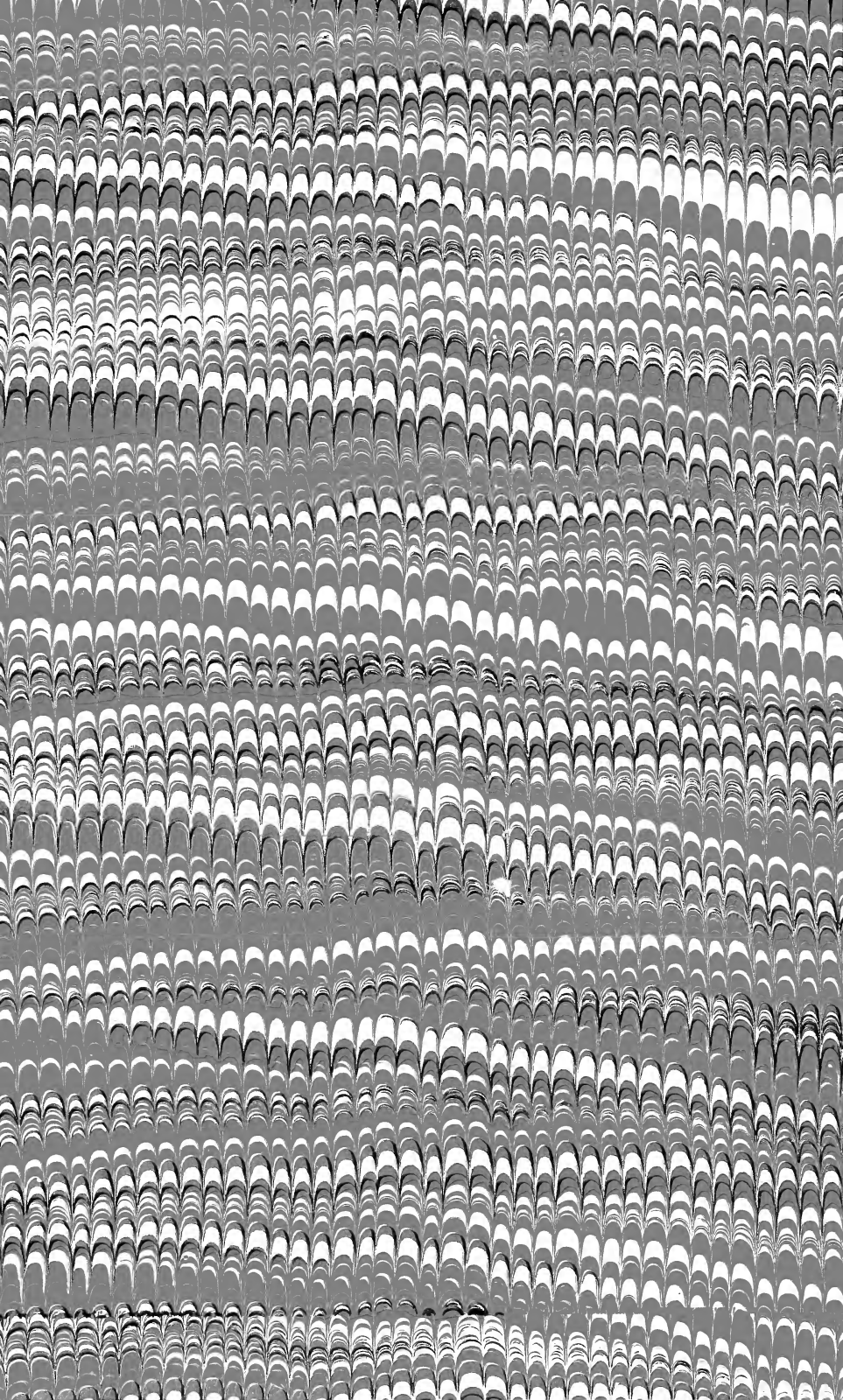

The Scottish Naturalist

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With which is incorporated

"The Annals of Scottish Natural History"

EDITED BY

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Keeper, Natural History Department, Royal Scottish Museum

AND

JAMES RITCHIE, M.A., D.Sc., F.R.S.E.
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(*Authors are responsible for nomenclature used.*)

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MOLLUSCA AT AVIEMORE AND THE INFLUENCE OF LIME.

By Professor A. E. Boycott, M.A., F.R.S.

As might be expected from the accounts of the mollusca of Easterness and Elgin* given by W. D. Roebuck in the Scottish Naturalist (1916, p. 107; 1917, p. 79), Aviemore is not a good place for snails. *Cochlicopa lubrica* and *Hyalinia fulva* are the commonest and may be found by ones and twos under stones and fallen timber, etc., in many places though it would be a good day's work to collect ten of each. *Hyalinia crystallina*, *Hy. radiatula*, *Vitrina pellucida* and *Vertigo edentula* are widespread and not much rarer and *Hy. alliaria* turns up now and then: a single *Helix hortensis* was found under some cardboard by the station and several *Clausilia rugosa* under a piece of sacking in an open wood towards Inverdruie. In wet places by the river I got also *Punctum pygmæum*, a few meagre *Succinea pfeifferi* and one *Limnæa truncatula*. In one specially favourable place—the purlieus of Rothiemurchus old church and the bank planted with bushes extending along by Doune—there were also *Hyalinia nitidula*, *Hy. pura*,† *Helix rotundata*, *H. lamellata*

* Roebuck's clear exposition of the boundaries of these Watsonian vice-counties (see also the map on p. 2 of the Cambridge County Geography of *Moray and Nairn* (1915)) is overlooked in the map issued with G. C. Druce's *Comital Flora of the British Isles* (1932) and the map is inconsistent with the summary printed on the back of it. Aviemore itself is in Elgin, not Easterness.

† All the *Hy. pura* found in the district were the white-shelled *margaritacea* form.

and *Carychium minimum*, and *Clausilia rugosa* occurred again on an ivied mortared garden wall at Polchar.

The chief object of this paper is not, however, to deplore a state of affairs for which the scenery is adequate compensation, but to call attention to the changes in quantity and quality of snails which occur when we pass from the acid schists and moraines to a few isolated patches of quarried limestone in the neighbourhood which are indicated on sheet 74 of the Geological map and the accompanying memoir.

(1) Isolated on the open moor at about 1100 feet on the slopes of An Suidhe behind Kincraig House is an old quarry with a band of coarsely crystalline limestone soluble enough to make a tufaceous deposit where the water drips down: a little below it are three limekilns. The quarry is in an exposed situation, but owing to the way it has been worked a good deal of it is well sheltered and there is a considerable growth of ferns. *Linum catharticum*, rock rose and thyme were abundant. In the quarry I found *Hyalinia alliaria*, *Hy. fulva*, *Hy. crystallina*, *Vitrina pellucida* and in addition large *Hyalinia cellaria* (up to 11 mm.), a good many *Clausilia rugosa*, a profusion of *Pupa umbilicata* (especially in its characteristic way on the little ledges on the quarry face), and finally among the stones at the most easterly kiln more than two dozen *Ena obscura* up to 9·5 mm. long and averaging 8·9 mm. *i.e.* fully up to its average size in the south of England. There were no *P. umbilicata* at the kiln which harboured *E. obscura*, and *P. rotundata* was not found at all, but for the first time in my visits I came home with a boxful of snails.

(2) On the north-east corner of Ord Bain by Loch an Eilan at about 1000 feet there is a sheltered cutting in the rock forming part of the rather extensive quarrying which has been done on the hill. It is surrounded by birch and pine wood and round about there were *Linum catharticum*, rock rose and thyme and, as Prof. E. J. Salisbury showed me, *Arabis hirsuta*. The earth in the cutting and in the mound at its foot fizzled well with acid as did about half the rabbit scrapes in that part of the hill. A pretty thorough

search of the cutting and of a bag of dead leaves taken home, dried, sieved and examined at leisure produced the following :—

Hyalinia cellaria 5	*Helix aculeata* 7
Hy. alliaria 4	*H. hortensis* 3
Hy. nitidula 1	*H. arbustorum* 6
Hy. pura 32	*Ena obscura* 1
Hy. crystallina 23	*Cochlicopa lubrica* 9
Hy. radiatula 4	*Pupa umbilicata* 84
Hy. fulva, 35	*Vertigo substriata* 2
Vitrina pellucida 2	*V. edentula* 28
Punctum pygmœum 5	*Clausilia rugosa* 2
Helix rotundata 37	*Carychium minimum* 312

(3) The old quarry on the hill north of Dulnain Bridge was unproductive. The ground was highly calcareous but the diggings are on the top of the bare hill and there is little local shelter: *Linum catharticum* and *Arabis hirsuta* were present. The sward looked just right for such snails as *Helix caperata* but we found only *Hyalinia radiatula* (2), *Hy. fulva* (1), *Hy. crystallina* (2), *Vitrina pellucida* (1), *Punctum pygmœum* (1), *Cochlicopa lubrica* (5) and *Vertigo pygmœa* (2). The kiln in the village has been incorporated into a garden: by the side of it was one *Hy. cellaria*.

(4) The quarry at 1500 feet on Creag a' Bhealaidh behind Kyllachy House in the upper Findhorn valley and its two limekilns were also disappointing. The place is dry and lacks shelter: we saw no calcareous plants on the calcareous earth and found only *Hy. alliaria*, *Hy. crystallina*, *Hy. fulva* and *Cochlicopa lubrica* — just the snails which might turn up "anywhere" in the district.

(5) A reference in C. St John's *Wild Sports and Natural History of the Highlands* (1927, p. 309) sent me to the large quarries by the Findhorn about 3 miles south of Forres (generally described as being at Cothall), which are of a rather different character as they lie nearly at sea-level in a sheltered river valley surrounded by woods: the limestone is also fine grained instead of coarsely crystalline. Nor have I any detailed knowledge of the mollusca in the neighbourhood, though a brief search showed that the quarry was by comparison very rich. Among the stones,

climbing up the abundant ash trees and in a bag of leaves there were :—

Hyalinia cellaria
Hy. alliaria
Hy. nitidula
Hy. pura
Hy. radiatula
Hy. crystallina
Hy. fulva
Vitrina pellucida
Punctum pygmæum
Helix rotundata ab
Helix hortensis
H. granulata c
H. aculeata (14)
Ena obscura ab
Cochlicopa lubrica
Pupa umbilicata ab
Vertigo substriata (2)
V. pusilla (13)
V. edentula c
Carychium minimum

Vertigo pusilla has not previously been found further north than Glen Nant in Argyll, and in Perth near Bridge of Allan. *Ena obscura* was taken at "Cothill on the Findhorn" by G. Gordon (Roebuck, *loc. cit.*, p. 86), but no more northerly locality is known and it has been recorded for only 18 of the 41 Scotch vice-counties.

Quantitatively, these limestone patches may have an almost dramatic effect on the snail fauna; the three productive places would rank pretty high as "good" loci in the South of England. And I strongly suspect that the only other place I found with a fair number of snails—the bank by Rothiemurchus church—was influenced by the limestone in Ord Bain about a mile distant; the bank is the edge of the river valley and on the direct line by which underground water would seep down from the hill towards

the Spey. I could find no soil there which gave a fizzle with acid, but the test is negative with less than about 0·5 per cent. of carbonate and smaller quantities than that may have some effect.

Qualitatively, the most interesting species are *Ena obscura* and *Pupa umbilicata*. Neither is strictly calcicole: indeed no calcicole inland mollusc occurs so far north. But they are "never" I believe found in any quantity except in the presence of natural or adventitious lime, being in much the same position as *Linum catharticum* and rock rose among the plants. *Hyalinia cellaria* and *Clausilia rugosa* are less particular but both belong to the group of snails which prefer, though they do not absolutely need, lime. The rarity of *Helix rotundata* is remarkable to an English collector: apart from the places I have mentioned I found it only at an old limekiln in Glen More, whereas in England it is probably the most abundant and one of the most ubiquitous species. The sum of the matter is I think that lime enables a number of species to live fairly successfully under climatic conditions which would otherwise be too much for them, and so extend their range to the north. On the occurrence and abundance of other species (notably *Cochlicopa lubrica* and *Hyalinia radiatula*) it has no favourable effect.

As usual, lime had no influence on the slugs. *Limax cinereoniger*, *L. tenellus*, *L. arborum*, *Agriolimax agrestis*, *A. lævis* (in wet places), *Arion ater*, *A. subfuscus*, *A. minimus* and *A. circumscriptus* are not uncommon and I found a single *Arion hortensis* in the hotel garden. They were decidedly not more abundant in the limestone quarries than elsewhere.

We had no opportunity of examining natural limestone which had not been quarried: with his wonderful instinct for getting what he needs, man seems to have found and used all the larger outcrops known to the Geological Survey. He has also spread their product about the neighbourhood: we came across at least four old limekilns in the Forest up to 7 miles from the nearest known quarry. This laborious transport of the limestone rather than the corresponding

lime (which weighs half as much) was undertaken I suppose to spread the consumption of fuel over a wider area. The ground round them was more or less calcareous but, with the exception of the *Helix rotundata* already mentioned, they yielded nothing of interest in the way of snails. The same was true of the few old ruins of mortared buildings which are scattered about at Alddruie and elsewhere. Quarrying on the whole probably makes the loci more favourable because it provides nooks and corners and loose stones which give good shelter. If H. G. Graham's remark * that "lime was hardly known as an aid to the soil before 1730" is applicable to Speyside, it began about 200 years ago and was, as far as we could learn, abandoned about 40 or 50 years since. It would be interesting to speculate as to how the snails reached these isolated patches, but it would really be an idle discussion, for we cannot be quite sure that *e.g. Ena obscura* and *Pupa umbilicata* do not occur in small numbers in the neighbourhood on acid ground: all that we can say is that they have not been found in such places, and we have to recognise that it is almost impossible to be certain that such secretive and reticent animals are absent from any area which has not been better searched than the one in question.

These facts show I think clearly enough the significance of calcareous ground. Others will I hope extend the enquiry to the other patches of limestone in the north of Scotland: there is, for example, a strip from Durness to Assynt in Sutherland and Ross which badly needs examination.

Water mollusca are not numerous. The pearl fishery seems to have pretty well exterminated *Margaritana margaritifera* in the Spey. *Ancylus fluviatilis* is surprisingly uncommon in the brooks and trickles. Mr Oldham has identified *Pisidium cinereum*, *P. milium*, *P. nitidum*, *P. hibernicum*, *P. lilljeborgii*, *P. obtusale* and *P. personatum* in my gatherings from various lochs and ditches. I had some hopes of finding exceptional forms of *Limnæa peregra* in the lochs but had no success: the most noticeable is a tiny form

* *Social Life of Scotland in the Eighteenth Century*, 1899, vol. i., pp. 154, 202.

in L. Einich which was mature and laying eggs when it was only 4-5 mm. long. *L. peregra* of ordinary types were found in some of the ditches near the river, in L. Balladern, L. Gamhna, L. an Eilan, L. Morlich, L. Pityoulish, L. Garten, L. Moy (on the way to Inverness), L. nan Geadas and in two unnamed ponds and one little stream in the Forest—all below 1000 feet. In the uplying lochs (*e.g.* L. Dubh on Craigellachie, L. Beanidh in Glen Einich and L. na Beinne in Glenmore) none could be found though some of them looked suitable enough, and a climb to L. Coire an Lochain on Braeriach (the highest named loch in Britain: 3267 feet) produced nothing.

British Fresh-water Copepods, Vol. III. By ROBERT GURNEY, M.A., D.Sc., F.L.S. Ray Society, 1933. Price 37s. 6d. This, the third volume of Dr Gurney's work on the British Fresh-water Copepods, deals with the Cyclopoida and the parasitic forms derived from them. As in the previous volumes the external parts of each species are fully described and illustrated by many clear line drawings, which add very greatly to the value of the book. There is also a very useful bibliography of papers dealing with the Fresh-water Copepods of the Palæarctic region.

The group of the Cyclopoida is a difficult one and has been subjected to much splitting by specialists, as for example Kiefer in his recent revision of the group. Dr Gurney, however, considers that in many cases the distinctions between species have been so finely drawn as to be unpractical. In his opinion there are, broadly speaking, only a few major species of Cyclops and round each can be gathered satellites which cannot be regarded as species without losing a grasp of reality.

The author is to be congratulated on his work. The excellent illustrations and useful keys should encourage further studies on the group.

NOTES ON ARRAN BIRDS.

By Winifred Boyd Watt.

The following notes are offered as supplementing the interesting observations published in the last number of the Scottish Naturalist (November-December 1933, pp. 171-2).

They are for a later period, 25th July to 11th August, in the same summer of 1933. Our total "score" was 54 species.

Raven.—Two flying across the Saddle, Glen Rosa, on 4th August.

Bullfinch.—Young birds in the wood above Brodick Castle.

Ring-Ouzel.—In Glen Cloy, 4th August.

Spotted Flycatcher with young at Strabane, Brodick.

Nightjar.—Young bird found dead on the Dark Glen road, 10th August.

Tawny Owl.—Heard calling.

Cuckoo.—Young seen in two places fostered by Meadow-pipits.

Sandwich Tern.—One or two near Merkland Point on 10th August.

Gulls.—Five species frequented Brodick Bay in varying numbers, viz., Blackheaded; Common; Herring; Lesser Blackbacked and Greater Blackbacked.

Kittiwake.—Swarms seen while sailing round Ailsa Craig.

Kestrel.—Near Brodick Castle and five seen at once in upper North Glen Sannox.

Common Shelduck.—Two immature birds on the north shore, Lamlash Bay, 1st August.

Heron.—One or two always seen on the shore near Brodick Castle. The old established heronry in the wood there still flourishes.

Gannet.—Occasionally off shore near Brodick Bay.

Manx Shearwater.—A few seen at sea off the Cock of Arran on 31st July.

NOTES ON BIRDS OF THE NORTH ATLANTIC.

By Dr C. Cairnie.

In these days of modern travel by great liners which forge ahead at high speed to make the journey from land to land in a few days, the ordinary Transatlantic passenger has little chance of seeing much of bird life on his short voyage, and, unless an enthusiast and specially alert, generally receives the impression that this region of the ocean, except for the occasional presence of a few gulls, is a lifeless waste of waters.

But to one who is in no particular haste and is content with a more leisurely, if less luxurious, method of reaching his destination, the cargo steamer offers far more favourable opportunities for observation.

There are few, if any, fellow passengers; no deck games or other diversions to distract; access can be had to all parts of the ship, and usually one is permitted on the bridge from which a commanding view of the surroundings can be had.

Having crossed the Atlantic in such a way on various occasions and kept a close watch, I have found bird life at sea to be fairly abundant at all times of the year, and, though the variety of species is somewhat limited, a sharp look-out is often rewarded by some interesting novelty.

During the spring and autumn migratory season land birds which have been blown out to sea or are making a passage to or from their northern breeding grounds are, as one would expect, to be met with at times.

Years ago, when crossing the Bay of Biscay towards the end of September, great numbers of Turtle Doves, Kestrels, Warblers, Wagtails, and others were to be seen about the ship. A strong easterly wind was blowing and these migrants, few of which would ever again see land, had no doubt been drifted out of their course.

But to the westward of the British Isles it is less common to encounter such stragglers, perhaps because of the prevalent westerly winds. On 14th August of last year, when about 150 miles from the Irish coast, we were visited by a Wheatear which flew round for some time, finally leaving us to make

for another vessel in the distance. There was a moderately strong wind from the N.E. and the presumption is that he was an early Greenlander blown out of his course while making the sea passage.

On another occasion in the month of May, when about 900 miles outward bound, more than half-way across the Atlantic, we were surprised by the appearance of a Chimney Swallow flitting about the decks.

On the American side such land wanderers are more frequent, especially during the autumn months.

I have seen the American Song Sparrow and the Grackle 300 miles from the Straits of Belle Isle, but was never so fortunate as to have the company of any of the large raptorials such as the Red-tailed Hawk or the Snowy Owl, which are sometimes captured in mid-Atlantic.

It is reasonable to suppose that the route taken by those of our waders which breed in Iceland and Arctic America, lies well to the northward of the track followed by shipping outward bound from the Clyde; but in some cases they appear to travel oversea direct to the Irish coast, for in mid-September a small wader, probably Sanderling, was seen about 60 miles west of Tory Island, a pair of Turnstones 200 miles farther out, and a Knot 550 miles from land. In each case the direction of flight was toward the S.E.

At the same season of the year parties of various kinds of waders, whose identity could not be recognised with certainty, were sighted at sea at a distance of from one to two hundred miles from the Straits of Belle Isle, heading in a south-westerly direction as if on the return flight from Greenland.

Arctic Tern are noted long distance travellers, which while mostly following the coast lines also strike boldly out across the open seas in their long journeys north and south. In the autumn Arctic or Common were met with in mid-ocean, singly, in pairs, and once in a flock of 21 birds.

Puffins in winter wander far out to sea and even in September odd birds may be encountered at any point from land to land.

Guillemots appear to be scarcely so pelagic in their habits.

About the banks of Newfoundland the Little Auk occurs in considerable numbers in spring and autumn.

With his strong powers of flight, it is not surprising to find that the Gannet, which is also common to both sides of the Atlantic, roves far afield, hundreds of miles from shore.

An outward-bound ship passing within sight of the Irish coast is generally accompanied by a crowd of various kinds of gulls, which gradually drop off as the distance from land increases, and in the vicinity of the American seaboard is again welcomed by a similar escort of Kittiwakes, Herring, and Great Black-backed, with the addition in winter of some Iceland Gulls.

The first to be missing from the list is the Herring Gull: he is rarely seen far from land: Lesser Black-backed up to 160 miles to the westward; but the Kittiwakes and the Great Black-backed, anywhere between the two Continents, especially during the winter months.

On one wild December voyage in which gale succeeded gale, Kittiwakes were with us all the way: and it was fascinating to watch the frail beautiful creatures as they followed astern and battled (or rather toyed) with the elements, the angled arched wings delicately balanced to catch the upward current of air, tail closed or expanded to aid in maintaining the necessary poise, black legs tucked up behind and bright eyes keeping a searching look-out on the tumbled waters beneath. By way of contrast the form and flight of its companion the Fulmar with its blunt head, plump body and straight stiff wings is very striking.

The Fulmar is, *par excellence*, *the* bird of the North Atlantic, being plentiful at all seasons from coast to coast: and one of the most familiar sights at sea is that of a flock of Fulmars following astern, swinging to and fro in pendulum fashion across the vessel's wake, with hardly a beat of the rigid wings. Scraps thrown overboard appear to be an attraction, but I think the quest is chiefly for marine organisms churned to the surface by the screw of the steamer.

The dark place and plumage is of frequent occurrence on the American side though I have never observed it on this,

varying from a uniform creamy-brown to a tint as dark as that of a young Herring Gull, the sombre colour relieved only by the lighter patch on the expanded wing.

Almost as numerous during the summer months from May to September, is the Great Shearwater, which does not follow astern but is to be seen skimming the waves or settled on the water in small parties or even in groups numbering 50 or 60 birds. The flight is easy and swift, faster than that of the Fulmar but of a similar gliding character, shown to best advantage in a high wind when the bird swings in great sweeping curves on his long narrow wings.

Sooty Shearwaters are very much less common and are solitary in habit or associate in company with the Great Shearwater. Though obviously smaller, the wings seem even narrower and longer in proportion to his size.

Various other kinds of Shearwater are sometimes sighted including the Manx, which may be seen as far out as 500 miles from the Irish coast.

The only small Petrels which I have been able to identify with certainty were Fork-tailed, and these, mostly on the American side, where they may often be seen flitting in erratic flight over the waves, like a longer-winged sort of House Martin.

Those who are on the watch for birds may count on the probability of picking up a Pomatorhine Skua about a day after leaving land. Generally he follows somewhat far astern, a large dark bird of rather heavy deliberate flight, recognisable by the characteristically twisted tail feathers.

On the Atlantic he is the commonest of the Skuas, but others are not infrequent and, when crossing in July last, I encountered all four species. Of these Buffon's is by far the most elegant and graceful, and the well-defined colour scheme and long tapering streamers leave no doubt in the mind of the observer of its identity. The tail of the Arctic appears short by comparison.

Some three years ago, about the middle of August, when making for the Straits of Belle Isle, and some 160 miles from land, several small flocks of migrating waders passed the ship, hastening towards the S.W. From the direction of

their flight I judged they had come from Greenland and, though an inadequate glimpse of rapidly moving objects is somewhat slender ground on which to form conclusions, I thought their appearance was that of Grey Phalaropes in winter dress.

On 23rd July of this year, when in almost the same position, we met at intervals with some small birds swimming on the surface or floating lightly and buoyantly on the water. As we neared them they rose and set off with the rapid flight of a typical wader, showing a transverse white line across the wing.

One bird which was flushed from under the bows soared upward turning and twisting in the air like a rising Snipe or Green Sandpiper. In most I could distinguish the rusty red tint of the breast, but one at least was white underneath. The size seemed larger than that of the Red-necked, or Northern as he is called by Canadian ornithologists, and I have little doubt that they were Grey Phalaropes in process of change from breeding to summer plumage.

There is something fascinating and mysterious about these beautiful birds. They are so exquisite in form and colouring, so dainty in their ways, and there is so much of their life-history of which we are ignorant. The Red-necked I had watched with delight at his breeding haunts in the Shetlands, and had often met with great flocks of Northern Phalaropes which had halted on the spring journey to their nesting grounds on the barren-lands to feed on the "sloughs" of the western prairies, when at times they covered the water as if with a dark mantle or rose in the air like a swarm of bees; but had never seen the Grey Phalarope except as a stuffed specimen or a prepared skin in a cabinet collection. He is known to breed in the circumpolar regions of the Old and New Worlds and in winter to stray as far south as New Zealand, but little information is procurable from the books about the time of his autumn moult or of his occurrence at sea. On returning home, therefore, I wrote Mr Travener of the National Museum at Ottawa to enquire if he were in possession of any data for that side of the Atlantic. In his reply Mr Travener stated that while

the Northern Phalarope migrated through the interior the records for the Grey are so few as to lead to the conclusion that it must travel by sea, and that even on the coast it is far from common.

Referring to the difficulty in distinguishing the Grey from the Northern in winter dress, the much less pronounced black bar through the eye is, he says, to his mind, the best distinguishing field mark.

Though he has little personal experience of the Grey Phalarope in life, he considers that the habits of the Northern may throw some light on those of the allied species.

"In 1930," Mr Travener writes, "Northern Phalaropes nested commonly at Churchill (Hudson Bay), where the adults left early in August before their young were fully fledged, and *before there was any change in their plumage for the winter dress.* Now, these adults appear down on our prairies about the same time or a little later *but always in winter plumage.* My tentative conclusion is that they go to sea as soon as they leave their young and undergo their moult at sea, not beginning their southward migration until well along in winter plumage. I would expect the Red (Grey) Phalarope to follow about the same procedure."

The fact that these birds were twice met with in that particular spot in the Atlantic crossings and nowhere else suggests that they largely follow a definite line of travel in their southward journey.

When looking over the notes, covering a considerable number of years, from which the foregoing account has been compiled, I came upon entries of doubtful birds, seen so far off or under such unfavourable conditions for observation as to make their identification a mere matter of speculation, and suggesting the possibility of further additions on some future voyage to the list here given.

THE AQUATIC COLEOPTERA OF THE COUNTY OF ANGUS, WITH A PRELIMINARY LIST FOR THE COUNTY OF KINCARDINE; AND WITH FURTHER REFERENCE TO THE *DERONECTES DEPRESSUS-ELEGANS* COMPLEX.

By FRANK BALFOUR-BROWNE, M.A. (Oxon et Cantab), F.R.S.E., F.Z.S., F.L.S., F.R.E.S., formerly Professor of Entomology at the Imperial College of Science, London.

THERE are very few published records for water-beetles for the county of Angus and none of recent date, in fact the last was in 1867 ([16]) * and this gave us a total list of 8 species. In 1908 I spent four days in September in the county and collected 64 species but, as at that time my only means of transport was a bicycle, my range was limited to a small area round the town of Forfar. Last year, staying at Edzell for a fortnight in June to July, I covered the whole county, having travelled about 1000 miles during that time; but the conditions from the point of view of water-collecting were very unsatisfactory, as most of the ponds and ditches were dry and, with the exception of two or three pools at the edge of Loch Brandy, I was unable to find any peat-moss which was not in an inflammable condition. This accounts for the fact that I only found 67 species, but as 20 of these are new to my previous list, the county list now runs to 84 species.

I revisited most of the places examined in 1908, but the various swampy areas which in that year yielded long lists of species were either bone dry or, at any rate, impossible to work. There have been some changes, no doubt, in that certain places have been drained and altered and the Loch of Forfar, especially, which in 1908 was very smelly and suggestive of a sewage tank and contained almost no water-beetles, is now a beautiful piece of clean water which yielded 12 species and abundant specimens.

* The numbers in brackets refer to the bibliography at the end of the paper.

In the following list of the species taken in the county, the nomenclature is that of Fowler's British Coleoptera, except in a few cases. Where a name has been changed I have given the name used by Fowler in brackets. I have taken all the species in the list excepting *Rhantus pulverosus*, which was recorded by Little (15) in 1838 as *Colymbetes pulverosus*. The record is quoted by Murray (17) without comment, but Sharp (21) adds "doubtful as Scottish." In 1909 I recorded the capture of a single specimen in Kirkcudbrightshire (1); but that and a record for two specimens taken in Renfrewshire in 1856 (19) are the only other Scottish records for the species, so that Sharp's comment is still justified, and I have consequently queried the record in the list. With regard to other published records, Wilson and Duncan (26) mention *Acilius scoticus* of Curtis as having been described from specimens captured near Kinordy, although it is now recognised that this is only a dark "habitat" form of *A. sulcatus*. They also mention *Hydrobius melanocephalus* which I take to be what we now call *Philhydrus fuscipennis*, Thoms. In 1908 I took at various places in peaty ground specimens which we then knew as *Ph. melanocephalus*, Ol. These were probably *Ph. fuscipennis*, but as last year I did not find any species of the genus excepting *minutus*, *fuscipennis* is included in the list as doubtful. I have assumed that *Hydroporus halensis* recorded by Hislop (13) from Glen Clova was *Deronectes griseo-striatus*, De G. NcNab (16) took a single ♀ of *Agabus solieri* "near Loch Brandy, Clova," an insect which is probably only a narrow form of the common *A. bipustulatus*; in any case, our British specimens have no characters which would justify specific distinction.

The Kincardine list is the result of only a few hours' collecting on two days, but as the one published list for that county includes only 6 species (25) (one of which, *Cœlambus parallelogrammus*—a record queried by the author now deceased—is almost certainly included erroneously, as the species has not otherwise occurred in Scotland) it may be useful to put my results on record.

	Forfar.	Kincardine.
Haliplus—		
obliquus, Panz.	x	
confinis, Steph.	x	
fulvus, F.	x	x
ruficollis, De G.	x	
wehnckei, Gerh.	x	
nomax, B. B.	x	x
fluviatilis, Aube	x	
lineatocollis, Marsh.	x	x
Laccophilus—		
obscurus, Panz.		x
Hyphydrus—		
ovatus, L.	x	
Cœlambus—		
5-lineatus, Zett.	x	x
inæqualis, F.	x	x
9-lineatus, Steph.	x	x
(parallelogrammus, Ahr.)?		o
Deronectes—		
assimilis, Payk.	x	x
depressus, F.	x	
elegans, Panz.	x	
12-pustulatus, Ol.	x	x
griseo-striatus, De G.	x	
Hydroporus—		
lepidus, Ol.	x	
rivalis, Gyll.	x	x
septentrionalis, Gyll.	x	o
davisii, Curt.	x	
lineatus, F.	x	
tristis, Payk.	x	
umbrosus, Gyll.	x	x
angustatus, Sturm.	x	
gyllenhalii, Schiödte	x	
morio, Dej.	x	x
vittula, Er.	x	
palustris, L.	x	x
erythrocephalus, L.	x	x
celatus, Clark	x	
memnonius, Nic.	x	
obscurus, Sturm.	x	
nigrita, F.	x	
discretus, Fairm.	x	
pubescens, Gyll.	x	x
planus, F.	x	
Agabus—		
guttatus, Payk.	x	
paludosus, F.	x	
affinis, Payk.	x	
unguicularis, Thoms.	x	

	Forfar.	Kincardine.
Agabus—		
congener, Payk.	x	x
nebulosus, Forst.	x	
femoralis, Payk.	o	
arcticus, Payk.	x	x
sturmii, Gyll.	x	
chalconotus, Panz.	x	
bipustulatus, L.	x	x
Platambus—		
maculatus, L.	x	
Ilybius—		
fuliginosus, F.	x	x
subæneus, Er.	x	
ater, De G.	x	
Rhantus—		
exoletus, Forst.	x	
pulverosus, Steph.	o	
notatus, Berg.	x	
bistriatus, Berg.	x	
Colymbetes—		
fuscus, L.	x	
Dytiscus—		
marginalis, L.	x	
Acilius—		
sulcatus, L.	x	
fasciatus, De G.	x	
Gyrinus—		
minutus, F.	x	
natator, Scop.	x	
marinus, Gyll.	x	
Hydrobius—		
fuscipes, L.	x	
„ form picicrus, Sharp	x	
fuscipes form æneus, Sol.		o
Philhydrus—		
fuscipennis, Thoms. ?	x	
frontalis, Er. (nigricans, Zett.)	x	
minutus, F.	x	
coarctatus, Gredl.	x	
Anacæna—		
globulus, Payk.	x	
limbata, F.	x	
Laccobius—		
striatulus, F. (nigriceps, Thoms.)	x	
bipunctatus, F. (alutaceus, Thoms.)	x	x
minutus, L.	x	x

	Forfar.	Kincardine.
Laccobius—		
biguttatus, Gerh. (bipunctatus, F.)	x	
Limnebius—		
truncatellus, Thoms.	x	
Helophorus—		
aquaticus, L.	x	x
viridicollis, Steph. (æneipennis, Thoms.)	x	
affinis, Marsh, form griseus, Herbst.	x	
brevipalpis, Bedel.	x	x
Henicocerus—		
exsculptus, Germ.	x	
Octhebius—		
marinus, Payk.	x	
pygmæus, F.	x	
bicolon, Germ.	x	
lejolisii, Rey and Muls	x	
Hydræna—		
riparia, Kug.	x	
longior, Rey. (angustata, Sturm.)	x	

x = taken by me. o = recorded.

With regard to the Haliplids, *H. obliquus*, of which I took a single specimen in 1908, occurred fairly commonly in one quarry within a few miles of the original place, but nowhere else in the county. The Scottish records for *H. confinis*, although few in number, are well distributed and suggest that the species occurs throughout Scotland, as it does throughout England. *H. fulvus*, a typical Scottish loch species, has already been recorded from most of the counties and vice-counties of Great Britain. *H. ruficollis* was remarkably scarce, but this is probably to be accounted for by the normal habitats having dried up. The 1908 records with regard to it are of no value as at that time several species were included under the name and were not finally separated until 1915 (3). Two specimens of *H. fluviatilis* occurred in the Loch of Forfar. The species is common enough in the Scottish lowlands but has not occurred in the western islands, nor did I take it in Sutherland or Caithness or in Easterness, where I have done a fair amount of collecting. *H. nomax* was the commonest Haliplid in most of the lochs examined, and it also occurred in Kincardineshire. It is probable that it occurs throughout Scotland, although I failed to find it in Sutherland and Caithness. I have seen specimens taken by D. J. Gordon in Ross East, but otherwise all the records are for south-west Scotland: Renfrew, Lanark and the Clyde Isles (Bute) to Kirkcudbright and Dumfries. It has also been taken in

Cumberland, Westmoreland and Lancs N., and I am not sure whether Cheshire specimens are typical *nomax* or the *browneanus* form which occupies the southern half of England and whose range is being studied by my friend E. J. Pearce, to whom I am indebted for most of my *browneanus* records.

A single specimen of *Hyphydrus ovatus* occurred in 1908 in a small loch with pond conditions and, curiously enough, without any recollection of the record, I again found a single specimen in the same place. Otherwise the species has not been recorded north of Midlothian.

Wherever I found the *Deronectes depressus-elegans* complex I collected specimens, and I thus obtained a large number

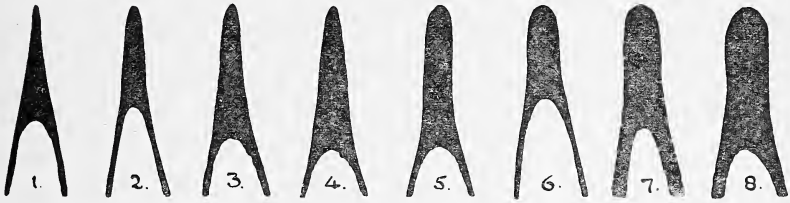


Chart showing different widths of apex of the ædeagus in individuals of *Deronectes depressus-elegans ;* from camera lucida drawings.

of individuals from nine different localities. In all but one of these I obtained males and I have examined the ædeagi of specimens from each of these eight localities.

I have reproduced a diagram of ædeagi given in a previous paper (8) and the Forfar specimens fit in as follows :—

Locality.	Width of apex of ædeagus.
Quarry with large and deep pools near Forfar	1 and 2
Rescobie Loch	2 „ 3
Creek at north end of Montrose Links	1 „ 2
Pond in sand-hills near Elliot Junction	2 „ 3
Balgavies Loch	2 „ 3
Forfar Waterworks Reservoir, near Tannadice	2
Loch of Forfar	3
Loch Lee	6 and 7

We have, therefore, in Angus a fairly complete range from extreme *elegans* to almost extreme *depressus* but, as in Kirkcudbrightshire (5) the segregation of forms is most definitely marked. The quarry pools produced a number

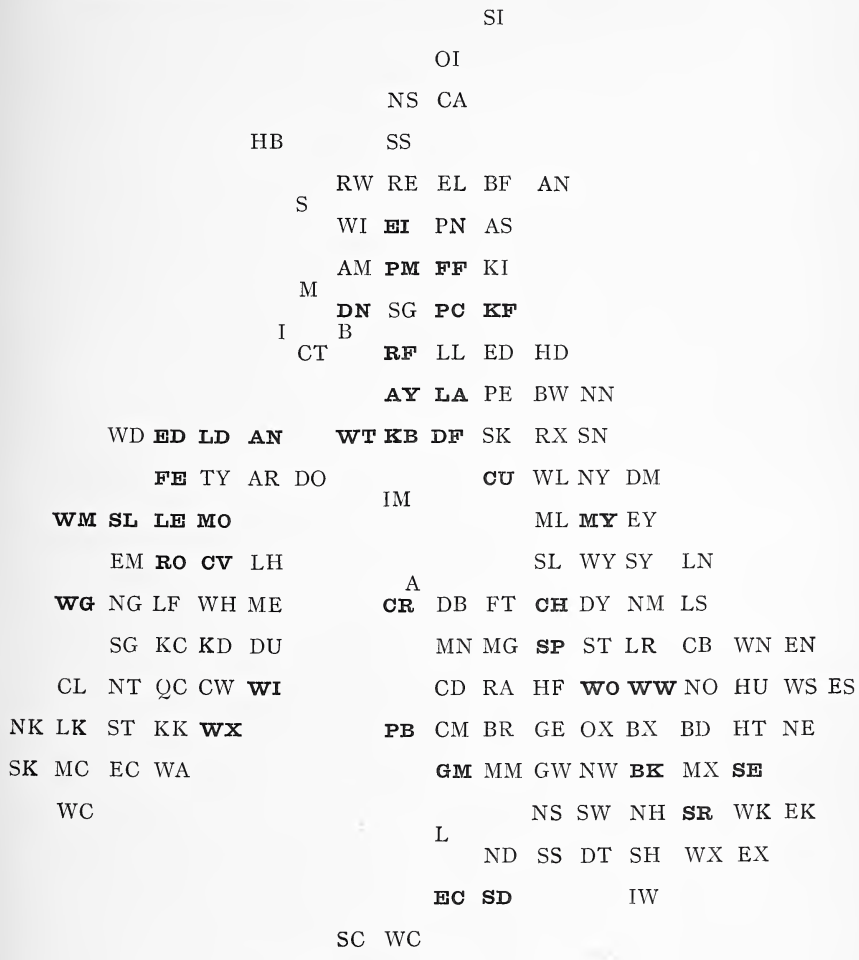
of specimens of which 9 males were examined and all had the fine pointed ædeagus. Rescobie Loch was only examined along one side and for about 200 yards, and again all the 5 males dissected were alike. Balgavies Loch specimens showed very slight variation but Loch Lee, from which I dissected 19 males, gave me only No. 6 and No. 7, and none of the eight localities produced any specimens at opposite ends of the scale. I will return to this point when I discuss Falkenström's recent paper.

Deronectes 12-pustulatus, which I did not see in 1908, occurred in a number of the collections and was one of the commoner species in lowland lochs and streams. With the possible exception of Cumberland, *D. griseo-striatus* is apparently confined to Scotland and Ireland and almost entirely to small highland lochs and large peat-holes from 800 feet upwards. In Angus, as already mentioned, it seems probable that it was first taken by Hislop in 1854 and that his "one or two" specimens came from the same neighbourhood as mine, 2000 feet up in Glen Clova.

Among the Hydropori, *H. lineatus* did not occur in 1908 but, in the one small loch already referred to in connection with *H. ovatus*, it was found in some numbers, but nowhere else. This is the most northern record for this species which, otherwise, has been recorded in Scotland only from Kirkcudbright, Berwick and Roxburgh, and one specimen, possibly this species, I recorded from Jura (6). All the other species of the genus in the list are generally distributed throughout Scotland, and most of them throughout England also.

Agabus affinis is so far known only from 14 of the 40 Scottish counties and vice-counties and from 14 of the 70 English and Welsh divisions. The Scottish records indicate a distribution from Easterness southward, but the English records are such that none of the eastern counties are represented in the list except Essex South. Hamlet Clark (12) recorded the species from Cambridge but, as I explained in a previous paper (7), this was before *A. unguicularis* had been distinguished and it is most probable that the latter was the species he took. A typomap of the

distribution of *A. affinis* indicates the peculiarities of the present known distribution.



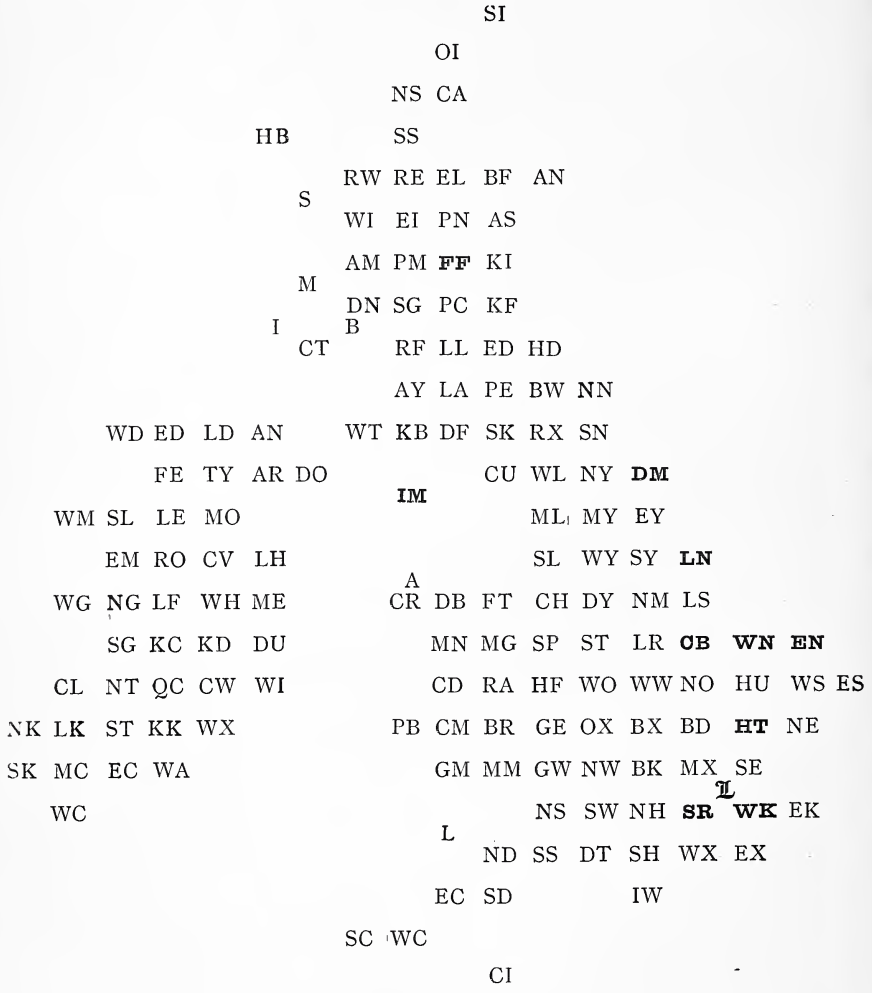
Britannic distribution of *Agabus affinis*, Payk.*

A. congener is a typical mountain species recorded from most of the Scottish divisions and from northern England and North Wales, but it was also taken in Berks and Kent West by A. J. Chitty and by David Sharp in the New

* [In a "typomap" the occurrence of the species concerned is indicated by heavy type. The letters in every case are a contraction for the names of the various vice-counties.—EDS.]

Forest (Hants South). Whether a minute examination of these southern specimens would indicate any definite difference is yet to be decided, but I have seen all the specimens and superficially they seem to be identical with those from the north.

Ilybius subæneus occurred in some numbers in the small loch already referred to in connection with *H. ovatus* and *H. lineatus*. Its British distribution is shown on a typomap.



Britannic distribution of *Ilybius subæneus*, Er.

It was only recently taken in Durham by Mrs Omer Cooper ([20]), and otherwise, except for a single specimen I took in the Isle of Man in 1910 ([2]), its range is limited between Lincoln North and Surrey and Kent West. Is it possible that it has only recently succeeded in establishing itself farther north? Bold worked Northumberland and Durham very well many years ago and he did not find the species. I collected in the Angus loch in 1908 and, although I took fewer species than last year, 9 as against 18, all were typical pond species, but there was nothing that I then noted which could have been *subæneus* misidentified. In 1911 I suggested that the single specimen taken in the Isle of Man was a stray one, and in another paper ([4]) I suggested that the "ectopic" occurrences of odd specimens were attempts on the part of the species to extend its range. The suggestion I have made to account for the presence of *I. subæneus* will not suit the case of *Rh. exoletus*, although this species occurred last year in two localities, one of which was very carefully worked in 1908. I took it in 1911 in the Aviemore district (Easterness) and Anderson Fergusson took it at Newtonmore (Easterness) in 1930. Moreover, whereas *I. subæneus* is an eastern and south-eastern species *Rh. exoletus* is more generally distributed in Britain, although it becomes rare in the south-west and it has been taken in many of the Irish counties, although there also it seems to be absent from the south-west. *Rh. notatus* was recorded in 1855 by A. Murray ([18]) and it was previously recorded by him ([17]) for Perth South and Clackmannan, Stirling and Berwick. A single specimen occurred last year in Angus, and although I did not take it in that county in 1908, I took a specimen near Cupar (Fife) in that year. The British distribution of this species is peculiar since, although it has occurred in Ayr in addition to the other Scottish counties mentioned, most of the English records are for the south-east and south, the others being Cumberland, Lancs (Mid or South undefined) and Cardigan, all dating back to Stephens and Hamlet Clark.

Acilius fasciatus was common in Restenneth peat-moss in 1908, but this ground was almost dry last year so that

it yielded very few species. This is now definitely a northern species and mainly Scottish, the only recent English records being for Yorks South-West where it was taken in 1903 ([23]) and 1914 ([11]), the earlier record being new to the county. In 1824 it was found in the Stilton and Yaxley fens, Hunts ([22]), in Whittlesea Mere, Cambs, in 1855 ([12]), and in Surrey in 1857 ([14]) so that, like *Ilybius subæneus*, it seems to be moving northwards.

After the Glacial Period there is every reason to believe that the Britannic area was invaded from the south-east, and the tendency of these immigrants was to spread west and north as climatic conditions improved. But as the ground became more and more occupied, the difficulties of new arrivals would have increased and there is, at the present time, a small group of water-beetles whose stronghold is in the south-east and which may be regarded as the latest arrivals awaiting an opportunity to advance.

This view would account satisfactorily for the movements of *I. subæneus* and *A. fasciatus*, but it is to be noted that both these species are widely spread throughout northern Europe and Asia, the former, or a very near relation, extending its range to northern America, and it is therefore difficult to believe that such hardy species should have failed to survive the Ice Age in this country and should only have arrived comparatively recently. On the other hand it is difficult otherwise to account for the fact that, until recently, neither of these species was known from the north and that, even now, neither has been taken north of Angus. Their disappearance from the more southern localities may be due not so much to some internal "urge" as to the elimination of suitable habitats in more civilised areas.

One of the extraordinary experiences of last year was the scarcity of Gyrinids. Not until the last day of my stay in the district did I see any and on that day one specimen of *G. natator* appeared in the net. Presumably the drought was at least partly responsible, but possibly also the majority of specimens were in an immature stage, although no larvæ were seen.

With regard to the Hydrophilidæ, only 13 species were

taken last year, giving an average of 1·6 species per collection as compared with 21 species and an average of 4 species per collection in 1908. The difference is probably partly due to the fact that September is a better month for aquatic beetles than mid-summer, but dry conditions doubtless further affected the results.

There are only a few comments to be made upon the group. *Hydræna longior* occurred on both occasions, in 1908 in a deep and large quarry-hole and last year in the Forfar reservoir near Tannadice, just where a small stream entered. The quarry-hole was examined again last year and yielded 8 species as against 12 on the previous visit, 3 of those 8 being new to the quarry; but whereas both *H. longior* and *H. riparia* were present in 1908 neither was to be found this year. *H. longior* is usually associated with running water, and the quarry-hole had no visible inflow or outflow but was presumably fed by springs and kept its level by seepage. *Bidessus minutissimus*, another running-water species, has been taken in a "ballast pit" at Killarney, Kerry North, by Bullock, who kindly sent me specimens, and I took one specimen in a quarry-pool in Guernsey in 1932. The record for *Octhebius lejolisii* is apparently the first for the east coast of Britain and the species presumably occurs in other suitable habitats, at least south of Angus.

(*To be continued*)

Manx Shearwater Inland.—Last August, while fishing on Loch Morar, a fresh water loch in Inverness-shire, I was amazed to get a perfect view of a Manx Shearwater resting on the surface of the water. Whether this bird was on autumn passage, which T. A. Coward records occasionally takes place over-land about this time of year, or whether it had been driven inland for shelter owing to the heavy gales which preceded its appearance, it is difficult to decide. At any rate it seems to be an observation of sufficient interest to record. I may here state that I know this species well, having seen it both in the Sound of Sleat, and in the Firth of Forth about this time of year.—J. G. Stewart, Edinburgh.

A RARE LONGICORN BEETLE (*MONOCHAMUS SUTOR*) IN EDINBURGH.

By D. K. Kevan.

In the last issue of this journal (November-December 1933) reference is made under "Current Literature" to a paper on the Genus *Monochamus*, Latr., in Britain, appearing in the September number of the *Entomologist's Monthly Magazine* (pp. 200-202).

Towards the end of August 1932 I was asked to call at a timber yard in Leith to see some large beetles that were emerging from a cargo of wood (sawn planks and boards) recently discharged from Archangel. Attention had first been drawn to something unusual by the flocking of birds on certain piles of wood, and it was found that they were feeding on larvæ contained in the timber. It was then that the beetles were also noticed, and for a week to ten days they emerged fairly regularly, but particularly on sunny days, emergence usually terminating about noon. As far as possible they were collected by workmen when noticed, and many were somewhat damaged in the process. It is impossible to say how many of these beetles appeared altogether, but I have fifteen good specimens and Sir T. Hudson-Beare, who accompanied me on one occasion, has a fair number — all these, apart from some damaged specimens most of which were useless and have been thrown away. Further specimens doubtless escaped and may have flown inland, but as far as is known this species has never been known to breed in Britain and any wanderers of this nature will doubtless have died a natural death. It would be interesting to know if these beetles were in their perfect form prior to the wood being loaded in the boat at Archangel, or whether final metamorphosis took place during the voyage to Leith. As far as is known, no *pupæ* were actually noted, but it does not follow that there were none when the steamer sailed.

At the same time as *Monochamus sutor* were emerging, a fine specimen of *Sirex gigas* was captured.

NOTES

Butterflies in Ayrshire.—As there are no records from this county in the last issue of the SCOTTISH NATURALIST it may be of interest to report that Red Admiral butterflies were *extraordinarily* plentiful here this autumn. I saw them from July onwards—even one belated specimen during the first week of this month (November).

I also saw the Painted Lady twice (23/8/33 and 10/9/33).—(Lieut.-Col.) G. HUGHES ONSLOW, Girvan.

Ray's Bream in the Firth of Forth.—A specimen of Ray's Bream, *Brama raii*, measuring 22¾ inches in length, was stranded on the beach at North Berwick on the 30th November 1933. It was found by Mr L. Calder, who kindly forwarded it to the Museum.

This fish is not uncommon in the Firth of Forth in certain years. The last big influx occurred in the autumn of 1927 when several specimens were recorded from this area and from other parts of the Scottish Coast (see SCOT. NAT., 1928, p. 28).—A. C. STEPHEN, Royal Scottish Museum.

Spisula (Mactra) subtruncata (da Costa) in the Firth of Forth.—The local extinction of this once abundant Bivalve in the Clyde area is the subject of a paper by Elmhirst and Stephen in *Nature* (123, p. 606, 1929). Its disappearance from North-East Ireland is similarly confirmed by Miss Nora Fisher in the *Journal of Conchology* (Vol. xix, No. 5, p. 152, July 1931).

I would therefore like to put on record that although, apparently, far from common, it is still living in the Firth of Forth at Seton Sands, Port Seton. Here as elsewhere old valves are frequently found on the shore, but there seems little doubt that the species must now be looked upon as one of the rarer molluscs of the area. During 1928-29 I found five living specimens left behind by the tide at H.W.M., and on 11th March 1933 I found three others—two at high-water, and one burrowing in the sand half-way to L.W.M. having doubtless been brought in thus far by the tide. The dimensions of the shells in my possession range from 14 × 17 × 10 mm. to 22 × 26 × 16 mm. in length, breadth and thickness respectively.—D. K. KEVAN, Edinburgh.

Black Tern in Renfrewshire.—There are so very few records of the Black Tern's appearance in the West of Scotland that I was greatly interested in seeing one flying around Balgray dam on 3rd September. My attention was first drawn to it by its cry as

it flew past me, hotly pursued by a Kestrel. After a few futile attempts the Hawk flew off and I had a good time watching the stranger. It never once dived into the water as other Terns do, but as it dipped down it seemed to feed on some insects flying over the surface. Its upper parts were uniform sooty black, white forehead and nape of neck; underparts, white; tail, very slightly forked. On 11th September at the same dam I watched a female Scaup. This is the first time I have noted this duck here.—NICOL HOPKINS, Oatlands, Glasgow.

Great Northern Diver in Lanarkshire.—Many SCOTTISH NATURALIST readers no doubt read the note, in a September issue of the *Daily Record*, of the occurrence of the Great Northern Diver, or Loon in Upper Lanarkshire. It would seem that the bird was found in a dying condition, the finder handing it over to Lord Dunglas, who writes me: "The chief interest in the occurrence of this regular visitor to our coasts in winter, is that it was found so far inland as Douglas. The two previous nights had been stormy with a strong N.E. wind which must have blown it out of its migratory course. The bird, I believe, died almost immediately after it was picked up, the date being 25th September, about the time the first Geese began to arrive. We did not have it stuffed as it was only a young bird and not in very good condition."—W. STEWART, Holytown.

Common Scoter in Lanarkshire.—This species is apparently a rare duck inland, indeed I am not aware of any "Clyde" record for Lanarkshire.

Since 1923, however, common Scoters have several times visited Forrestburn Reservoir in spring, a sheet of water situated in an eastern corner of the county, and draining into "Forth."

In April of that year I had the unexpected good fortune to find one of these black ducks resting placidly on the rather choppy surface, and on a subsequent visit, on 4th April 1925, found a pair on the same part of the "loch." These specimens, however, were much more lively, both at once diving, and on re-appearing seemed to resent being spied on, at once rising from the water, and flying in a north-easterly direction.

With strong binoculars I was able to follow their flight for several miles, which I found, on consulting a map, would take them —via Linlithgow Loch—to the Firth of Forth, some fourteen miles distant. Since then single specimens of the Common Scoter have been observed on 6th May 1926, and on 28th March 1928.—W. STEWART, Holytown.

Scottish Records of Cephalopods. (1) A "Cephalopod Year" in the Clyde.—During the month of September 1933, *Eledone cirrosa* was observed to be of unusually frequent occurrence in Lochranza Bay, Isle of Arran, at depths ranging from three to five fathoms. While fishing for Flounders, Saithe, and the like, from a small boat many specimens were brought to the surface either clinging to the bait (Clam, Mussel, or Herring) or else attached by means of their suckers to the lead sinker. As many as twenty were caught in this way, and other fishers had similar experiences. The specimens ranged from 6 to 9 inches in length, the majority being of the smaller size.

Mr Richard Elmhirst, Superintendent of the Marine Biological Laboratory, Millport, has recently informed us that large numbers of *Loligo Forbesi* also occurred throughout the summer in the Clyde sea area. These facts seem to indicate a "Cephalopod Year."

In view of the few records of such phenomena it is thought that the above note may be of general interest.—J. E. Forrest and A. R. Waterston, Edinburgh.

(2) Cuttlefishes stranded at Bo'ness.—Further to the above note it is interesting to record another occurrence of these animals. At Bo'ness a large number of *Eledone cirrosa* were washed up by the high tide on the 19th and 20th October 1933. The animals were caught behind large stones and were unable to get clear before being stranded by the receding tide. They were said to measure between 8 and 16 inches in length.

It was stated in the press that there were two rows of suckers on the arms, an arrangement which is characteristic of the genus *Polypus*, not *Eledone*. In a sample of six animals received at the museum all the suckers were in a single row, although at first sight they seemed to be in two rows due to the crowding of the suckers by the contraction of the arm, and the animals were therefore *E. cirrosa*.

The importance of this observation lies in the fact that *Polypus vulgaris* was recorded by earlier authors from the Firth of Forth, *e.g.*, Leslie and Herdman in their *Invertebrate Fauna of the Firth of Forth*. The species does not seem to occur now, and it is doubtful if it ever did occur. It is more than possible that the two species were confused.—A. C. Stephen, Royal Scottish Museum, Edinburgh.

Food of Yellow Hammer.—At Powfoot, Annan, Dumfriesshire, on 14th August 1933, I kept a Yellow Hammer's nest of young birds under observation whilst the old birds brought food.

The nest was a mere two or three yards above high-water mark and in a small buckthorn bush not three feet in height. On an average every two minutes a moth or caterpillar was brought, and three out of five of the victims were Silver Y moths. The birds would sit near the nest for perhaps half a minute before slipping into the nest and from a position only four yards away, the victims were clearly visible and identifiable.—H. C. S. HALTON, Essex Museum of Natural History, London, E. 15.

Birds of the Inner Hebrides—Information wanted.—I am attempting to collect as much information as possible on the birds of the Inner Hebrides, particularly the Islands of Canna, Colonsay, Muck, Rum and Eigg, and would be very grateful if any of your readers could supply me with information. Lists of birds seen with notes on status would be particularly acceptable.—GEORGE WATERSTON, 27 Inverleith Terrace, Edinburgh.

BOOK NOTICES

Ronay: a Description of the Islands of North Rona and Sula Sgeir, together with their Geography, Topography, History, and Natural History, etc., to which is appended a Short Account of the Seven Hunters, or Flannan Islands. By MALCOLM STEWART. London: Humphrey Milford, Oxford University Press, 1933, 8vo, 73 pages, 29 figures (mostly from photographic plates), frontispiece map and 3 folding maps. Price 7s. 6d. net.

The history, general and natural, of these tiny islands, washed by the stormy waves of the North Atlantic, and as remote from Cape Wrath as St Kilda is from the Outer Hebrides, cannot fail to offer material of much interest to the zoologist, botanist and archæologist. North Rona was visited by the author in 1930 and 1931, and the neighbouring island of Sula Sgeir in 1932. On the two former occasions he was accompanied by a companion. The smaller island was reached by steam trawler.

The houses of North Rona, four or five in number, were constructed with three feet of wall below the ground and three feet above in order to withstand "the violence of the wind in this region." They are carefully described, and full measurements given; while an interesting account is given of one building which was constructed and used as a Chapel, with attendant graveyard. Lists of the birds and plants found on the island are also printed. Shorter sections follow, dealing with the other islands mentioned in the title; while two appendices and a bibliography conclude a volume which is well printed and beautifully illustrated.

The Ecology of Animals. By CHARLES ELTON, M.A. London: Methuen & Co. Ltd., 1933, foolscap 8vo, 97 pages. Price 3s. 6d. net. In continuance of their valuable series of "Monographs on Biological Subjects" the present volume appears at an opportune moment, when the subject of ecology, or the relations of animals and plants to their environment, is becoming more and more popular among students of natural history. Only within a comparatively recent period has it been realised that there is still an enormous amount of work to be done by the field naturalist, but it is a type of investigation of an entirely different nature to the formation of systematic collections and faunal lists, which was formerly the aim of most out-of-door workers. Mr Elton, a well-known authority on the subject, gives, within less than a hundred pages, a cleverly written summary of the aims of this new science and shows that there are still innumerable problems to be solved in connection with the wild life of even the commonest animals. The intricate relations which bind together into "chains of life" many of our most familiar creatures; the statistics which have to be compiled regarding the increase or fluctuation of animal populations; the careful survey of habitats; and various economic problems—are all discussed briefly, but in a very pleasant and readable style. It is shown that much valuable work, especially team-work, may be done by the amateur or even the beginner. A useful bibliography concludes this most suggestive and inspiring little volume. We miss, however, a mention of A. S. Pearse's *Animal Ecology*, a capital book published in 1926. We notice a single misprint—on p. 81, line 13—*loeae* should read *oleae*.

Exploring the Animal World. By CHARLES ELTON. London: George Allen and Unwin Ltd., 1933, foolscap 8vo, 119 pages and 3 woodcuts. Price 3s. 6d. net. This little volume is based upon a series of national broadcast talks, and is therefore necessarily written in simple unscientific language. The book consists of half a dozen chapters, the titles of which sufficiently indicate their scope. The first of these is an "Introduction," then follow "How to look for Animals," "Woodland Life," "Animal Life at Night," "Nature Sanctuaries" and "Plagues of Animals." The whole volume is very suggestive and full of pleasant reading. The woodcuts are in the modern style of art and are well executed and the typography clear and dainty.

Laboratory Directions in General Zoology. By WINTERTON C. CURTIS, MARY J. GUTHRIE and FARRIS H. WOODS. New York: John Wiley and Sons, Inc. London: Chapman & Hall, Ltd. Second Edition, Revised, 1933, 8vo, 164 pages and 60 figures. Price 9s. 6d. net. This is a companion volume to the *Text-book in General Zoology* by Curtis and Guthrie, noticed in our last issue. It consists essentially of a series of practical "exercises" by working through which the student becomes familiar with the anatomy of the principal types of the animal kingdom. The directions are clear and the figures excellent. In most of the illustrations the names of the various details of structure are given in full, and not by contractions or the letters, *a*, *b*, *c*, etc., thus avoiding

reference to a list of abbreviations—a troublesome process often necessary in modern text-books. We should like to see this method more generally adopted in scientific manuals. The extra space required is negligible, and more than compensated for by the gain in convenience.

The Dissection of the Rabbit. By R. H. WHITEHOUSE, D.Sc. Birm., and A. J. GROVE, M.A. Camb., D.Sc. Birm. London: University Tutorial Press Ltd., 1933, 195 pages, frontispiece and 78 figures. Price 3s. For anyone desirous of becoming fully acquainted with the anatomy of the Rabbit as a type of Mammals, we cannot recommend a more serviceable book than that now before us. It is essentially practical and the instructions clear throughout. There is an excellent introduction, giving the student sound advice as to laboratory methods, the use and care of tools and instruments, and preparation for actual dissection. Then follows a detailed series of paragraphs dealing with the dissection of the animal, commencing with the axial and appendicular skeleton, with a description of external features, the general dissection of the body, the various organs, blood-vessels and the fifth and seventh cranial nerves. The numerous figures are beautifully clear and the names of the various structures given in the fullest detail. The typography is exceptionally good, the paper a pleasant shade of buff, and the price remarkably low.

Wild Life Stories. By MARIBEL EDWIN. London: Thomas Nelson & Sons Ltd., 8vo, 280 pages, coloured frontispiece and 9 full-page illustrations. Price 3s. 6d. net. This entertaining volume is one of a new series of books "for boys and girls of all ages." There are twenty volumes in the series, that now before us being the only one dealing with natural history. In its twelve chapters the life-history of a number of animals, more or less familiar to the young person who is accustomed to visiting a Zoo, is depicted, not as creatures in captivity but enjoying life under perfectly wild and natural conditions. The various scenes and incidents are vividly described and the mentality of the animals imagined and portrayed in a manner which proves the authoress to possess a sound knowledge of nature and great dramatic skill. Her sketches range from the tropics to the poles, and real word pictures are drawn of the various incidents which beset the natural life of such animals as the Polar Bear, the Reindeer, the Kangaroo and other well-known creatures. The illustrations, by William Smith, are vigorous, the typography excellent, and the binding a tasty fadeless blue.

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(*Authors are responsible for nomenclature used.*)

The Scottish Naturalist

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A RECORD SCOTCH WILD CAT.

By R. I. Pocock, F.R.S. (Unofficial Assistant, Zoological Department of the British Museum, Nat. Hist.)

In January of this year, Sir R. W. Brooke, Bart., D.S.O., M.C., sent to the Natural History Museum, S. Kensington, a male Wild Cat, killed at Ardgay, Ross-shire, which appeared to be of exceptional size. When weighed and measured it proved to be the largest Scotch Wild Cat in the National Collection and, as such, is a valuable accession; but it calls for special mention because a comparison of it with other examples in the collection and with previously published accounts of this race brought to light one or two new facts of some interest.

The following table contains the flesh measurements, converted from millimetres into English inches, 25 mm. to the inch, of this Cat and of four other males, similarly measured by modern methods, in the British Museum, with the weights where available.

Locality.	Head and Body.	Tail.	Total.	Hind Foot.	Weight.	Donor.
					Lb. oz.	
Ardgay, ad. ♂	25	$14\frac{2}{5}$	$39\frac{2}{5}$	$5\frac{4}{5}$	15 10	Sir R. W. Brooke
Glenmoriston, ad. ♂	$23\frac{1}{2}$	13	$36\frac{1}{2}$	$5\frac{3}{5}$	13 8	A. L. Marriott
Fort William, ad. ♂	$22\frac{3}{5}$	$12\frac{2}{5}$	35	$5\frac{1}{5}$	10 4	Sir H. Maxwell
Beauly, ad. ♂	$22\frac{4}{5}$	12	$34\frac{4}{5}$	$5\frac{1}{5}$	...	Sir L. Fletcher
Invermoriston, yg. ad. ♂	$21\frac{3}{5}$	$13\frac{1}{2}$	35	5+	...	A. H. Cocks
? ,, yg. ad. ♀	$21\frac{2}{5}$	$11\frac{3}{5}$	33	5−	...	,,

Sir R. W. Brooke's specimen is, however, by no means the largest British Wild Cat recorded. Bewick, for example, according to Hamilton, stated that one killed in Cumberland was over 5 feet in total length. That dimension may be at once dismissed. But a great many recent Natural Histories contain records of 45 inches or thereabouts, in length, from nose tip to tail tip. Obviously this measurement has been copied by the authors concerned; and its source, so far as I have had time to trace it, appears to be the following passage in Lydekker's account of the Wild Cat in Warne's *Natural History*, vol. i., p. 422, 1893-94:— "According to the authors of Bell's *British Quadrupeds*,* the average length is about 2 feet 9 inches, of which 11 inches is taken up by the tail; but an unusually large specimen killed near Cawdor Castle had a length of 3 feet 9 inches from nose to tip of tail." This statement he reprinted in Harmsworth's *Natural History*, vol. i., p. 403, 1910; but in his volume on *British Mammals* in Allen's Nat. Library and again in the volume on Cats in the same series, he apparently ignored Bell's smaller dimension, stating that the Wild Cat has a head and body measurement of 34 inches, the tail being 11¼ inches. This, as nearly as may be, is the size of the Cawdor Castle Cat he previously described as "unusually large." I cannot discover the source of the information regarding this Cawdor Castle Cat. Johnston (*British Mammals*, p. 182, 1903), who copied his data from Warne's *Natural History*, said Bell was the authority; but he evidently misunderstood Lydekker's somewhat ambiguous statement, because in neither of the two editions of Bell is the specimen mentioned. Millais (*Mammals of Great Britain and Ireland*, vol. i., p. 169, 1904) copied this mistake from Johnston; but at the same time he recorded a Cat from Moidart in Ross-shire as 46 inches from nose to tail tip.†

* This is the second edition by Bell, Tomes and Alston, 1874.

† Other authors who, directly or indirectly, copied Lydekker's record of this big Cat are Step (*Animal Life of the British Isles*), and Mortimer Batten (*Habits and Character of British Wild Animals*, p. 340, 1928). Shepheard-Walwyn (*The Spirit of the Wild*, p. 83, 1924) goes one better, claiming that the Wild Cat is frequently as much as 4 feet long.

There is, however, so far as I can ascertain, no information as to how or by whom these apparently huge specimens from Castle Cawdor and Moidart were measured. Even if the tape was run over the curves and the hairs at the tip of the tail included, the Cats were, in my opinion, incredibly large. There is justification indeed for the suspicion that their dimensions, if correct, were taken from stripped, pegged out, and stretched skins. This would explain their exceptional length.

Hamilton (*The Wild Cat of Europe*, p. 43, 1896) reprinted practically all the measurements of European Wild Cats in the literature known to him, including those of Gesner, Daubenton, Temminck, Macgillivray, Bell, Jenyns and Cocks. I suspect Millais summarised the particulars given by Hamilton * when he stated that the usual dimensions are :— Head and body from 22 to 26 inches, tail from 11 to 14 inches. But we do not know how the measurements were taken by naturalists of the past. Almost certainly the hairs at the tip of the tail were included and as likely as not the tape was laid over the curves of the head and body. However that may be, Sir R. Brooke's specimen can confidently be claimed, from the data known to me, to be the largest Scotch Wild Cat measured by accepted modern methods, the hairs at the tail-tip, 29 mm. (over 1 inch) long, being excluded.

Of weight records there are very few. According to Hamilton the Scotch Wild Cat seldom exceeds 10 lb. The only weight of adults known to me, taken from specimens sent in the flesh to the Museum, are entered in the Table. Clearly Sir R. Brooke's specimen is a "record" by a considerable amount.

But this large Cat and the others entered in the Table have an additional interest. They show that the Scotch Wild Cat is a much bigger animal than would be inferred from the flesh-measurements of three specimens from Invermoriston recorded by Gerritt Miller, who described the

* He ignored, however, and I think wisely, Hamilton's record by Fleming of a specimen with the head and body 28 inches and the tail 17 inches, giving a total of 45 inches from tip to tip. These dimensions, especially of the tail, suggest a stretched skin.

Scotch race as *Felis silvestris grampia* (*Cat. Mamm. Western Europe*, p. 464, 1912). Two of these, a ♂, the type of *grampia*, and a ♀, are included in my Table. The dimensions of these two and of the third included by Miller, although admittedly young adults, are apt to convey the impression that the average head and body measurement of the Scotch Wild Cat is only about 21½ inches, whereas the average of the four adult males which head the Table is 23½ inches. This is nearly 2 inches longer than an adult ♂ of the typical race, *F. silvestris silvestris*, from Northern Germany recorded by Miller in his Catalogue; and none of the flesh-measured skins of this Central European race in the British Museum quite reaches that average, all being considerably smaller than Sir R. W. Brooke's specimen. This Cat is only equalled approximately by one flesh-measured skin from the Continent, namely a skin recorded by Cabrera (*Fauna Iberica; Mammalia*, p. 205, 1914), from the neighbourhood of Madrid, of the Central and Southern Spanish race, *Felis silvestris tartessia* which was stated by Miller, who named it, to be larger than the Wild Cats of Scotland and Central Europe. The dimensions of this Spanish skin were: head and body 25⅕ inches, tail 12⅖, foot 5⅕, the head and body being only negligibly longer than in Sir R. Brooke's specimen, the tail 2 inches shorter and the foot a little shorter. Hence the Scotch specimen is actually longer from tip to tip and may on those grounds be claimed as the "record" Wild Cat of Europe.*

The skulls may be briefly dismissed. In Miller's Catalogue will be found detailed dimensions of 6 Scotch

* Unfortunately none of the skins of the Spanish Wild Cat recorded by Miller was measured in the flesh. The dimensions of one he quoted, namely head and body 26 inches, tail 14 inches, giving a tip to tip length of 40 inches, and hind-foot 5⅖, were taken from a made-up skin almost certainly in my opinion stretched in preparation. Satunin (*Mitth. Kauk. Mus.*, 2, pp. 154 and 316, 1905) recorded two skins of the Caucasian race, *Felis silvestris caucasicus*, one a little, the other considerably larger than Sir R. Brooke's specimen. But his measurements were taken from flat skins and may be ruled out. But Ogneff's record (*Zeits. Säugetierk.*, 5, p. 52, 1930) of a ♀ with the head and body 25⅕ inches, tail 13⅕, hind foot 5⅖, suggests that the Caucasian race is larger on the average than the Central European and Scotch races.

skulls, 4 ♂ and 1 ♀, from Inverness-shire, all young adults, and 1, adult but unsexed, from Sutherlandshire which he queried as ♂ but which, with more material to judge from, I consider to be ♀.* The 4 young adult ♂ skulls range from 85 to 89 mm. in condylobasal length and from 61 to 68 mm. in zygomatic breadth. But since the Great War, the Museum has received 4 adult ♂ skulls, 2 from Beauly (*Sir L. Fletcher* and *Col. Clarke*), 1 from Glenmoriston (*A. L. Marriott*) and the one from Ardgay (*Sir R. W. Brooke*). The condylobasal length of these varies from 93 to 99 mm. and the zygomatic breadth from 73 to 76 mm., the larger dimension in each case being supplied by the skull from Ardgay. These dimensions show that the ♂ Scotch Wild Cat has a much bigger skull than is suggested by those entered in Miller's list. Moreover, of three adult ♂ skulls of the Central European race, from Germany and France, the longest has a condylobasal length of 90 mm. and the broadest a zygomatic breadth of 70 mm. These measurements are less than in the smallest of the Scotch Cats and much less than in Sir R. Brooke's specimen.

The skulls of the Spanish Cat from Andalucia tell a different tale. Of the three adult ♂ skulls in the British Museum, one, with a condylobasal length of 103 mm. and a zygomatic breadth of 80 mm., is larger than Sir R. Brooke's specimen and the other two are close to it. In both of these the occiput is broken; but I estimate the condylobasal length to have been approximately 98 mm.,† which is very nearly the same as in Sir R. Brooke's specimen. The zygomatic breadth of one of them is 77, of the other 72 mm.,

* This skull (*J. Harvie Brown*) has a condylobasal length of 90 mm. and a zygomatic breadth of 67 mm., the corresponding dimensions of the ♀ measured by Miller being only just over 82 and barely 63½ mm. But an old ♀ skull, subsequently received from A. H. Cocks, has a condylobasal length of 89 mm., and a breadth of 71 mm. Thus it is almost the same length as the Sutherlandshire skull, but noticeably broader because it is older.

† Miller estimated this length as approximately 93 mm. But I am sure that measurement is too small, since the total lengths of the skulls are respectively 105 and 103 mm., that of Sir R. Brooke's specimen being 106 mm. and of the largest Spanish skull 109 mm. Probably 93 was misprinted for 98.

the latter being a younger skull. These Andalucian skulls are, therefore, on the average, bigger than the Scotch skulls. Also, as Miller maintained, they have slightly larger teeth; but the difference between the two races in cranial and dental characters is not nearly so great as has been supposed. From the data at my disposal then it seems that the Scotch race has on the average at least a larger skull than the Central European race, although this may be due to insufficient material of the latter, and a smaller skull and smaller teeth than the Spanish race.

Apart from size the Scotch race is distinguished from the Central European race on the average by its darker colour and more pronounced pattern. But the colour and pattern are alike variable. The colour of the upper side ranges through all gradations from ochreous brown to grey. Two of the darkest skins in the British Museum are, one from Inverness-shire (*J. Macpherson*) and one from Knock Fin, on the Beauly River (*Col. Stephenson Clark*), the latter having more black pigment in the dorsal pelage, but the pale areas of the contour hairs more buffy, a very handsome skin. Sir R. Brooke's example from Ardgay is nearly as dark. These are winter skins collected between January and the beginning of March. The palest skin, which has the "silvery or frosted" appearance matching most of the continental skins, is the one from Glenmoriston (*A. L. Marriott*) dated 23rd September. The difference in the dates suggests that the difference in the tint may be seasonal; but there is not sufficient material of summer skins to establish this point, these Cats being usually captured in winter.

As regards the pattern the stripes on the head, neck, back, tail, limbs, and the spots on the under side, are always pronounced and black, the distinctness of the limb stripes being a feature of *grampia* as compared with typical *silvestris* from Germany, France and elsewhere on the Continent; but the lateral bands and spots on the shoulders, flanks and thighs, although in almost all cases conspicuous, may be as obscure as in typical *silvestris*. In a dark skin from Spean Bridge, 21st February, for instance, this pattern is

scarcely detectable, but the coat in this specimen is poor and coming away in matted tufts as if moulting, although the date is early for that process. Another rather obscurely patterned skin, but undated, was from Beauly (*Sir L. Fletcher*). When conspicuous the pattern varies in tint from pale brown, much paler than the dorsal stripes, as in the "frosted" Glenmoriston skin, to blackish-brown nearly as dark as the dorsal stripes, as in a skin from Dundonnell (*Miss Firth*), dated 27th November, which has the lateral pattern more emphatic than in any other example in the British Museum.

The pattern of the Spanish Cat, *tartessia*, is very similar to that of *grampia*, as Miller stated; but the ground colour is on the average greyer in the three skins examined, one of them being marked "winter." They are about as grey indeed as the greyest Scotch skin from Glenmoriston collected in September. It may also be added that the coat of the Southern Spanish Cats is not so luxuriant as in the Scotch Cats, as might be expected from their more southern distribution.

Grey Seal in the Firth of Forth.—It may interest readers to know that I saw a Grey Seal close inshore off the Marine Point, Dirleton, almost opposite Fidra, on Saturday afternoon, 2nd December. It was within 10 yards of the shore and was seen very clearly. I have seen such animals on the West Coast quite often, once even within Ayr harbour, but I have never, to my recollection, seen them on the East Coast before.—Ian Hay, Edinburgh.

[The last occurrence of the Grey Seal in the Firth of Forth known to us was recorded in the *Annals of Scottish Natural History* for 1907, page 245, where it is stated that one was seen in the bay to the north-west of Rossend Castle, Burntisland, on 27th July of that year.—Eds.]

NOTES

Osprey in Dumfriesshire.—An Osprey was alleged to have been seen on 17th May 1933, fishing in the River Nith, near Thornhill. Five days later I investigated this report and obtained circumstantial details from the gamekeeper who actually saw the Osprey hover, catch its prey, and fly off with it in approved fashion. Two other persons saw a "strange hawk" on the river about this period, and another gamekeeper told me that, one evening, he had disturbed a "large brown bird" out of some trees near by. These trees were the same as those to which the first-named gamekeeper saw the Osprey fly with its prey. I could find no evidence, such as fish scales or the like but, from the description given to me, I have no doubt as to this local occurrence of the Osprey.—HUGH S. GLADSTONE, Dumfries.

Great Crested Grebe *versus* Gull.—On the 29th October 1933, when walking round Linlithgow Loch with Mr W. Watson, we observed a Great Crested Grebe, with a small fish in its bill, swimming towards a fully grown chick with the intention of feeding it. As the old bird approached the chick, a Gull swooped down at it, evidently with the object of depriving it of the fish, but the Grebe promptly dived. Hovering over the spot, the Gull waited for its reappearance, and when the Grebe again came to the surface it was a few yards nearer the chick and still had the fish in its bill. The Gull again swooped at it, the Grebe going under at once, and when next it appeared it was close to the young one. Before it had time to feed the chick the Gull returned to the attack, and the Grebe dived again. Once more the Grebe appeared, and then dived again immediately, but in the short time it was on the surface on this occasion, it had evidently, by sound or other means, let the chick understand what it should do, and they both dived simultaneously. In a few seconds both came to the surface, and we saw the young bird in the act of swallowing the fish, having been fed below.

The interesting point is the transference of the fish *under water*, thus outwitting the Gull.

The Gull, which needless to say was a Black-headed Gull, now seeing it was foiled, flew leisurely away on the lookout for other means of obtaining a meal.—DAVID HAMILTON, Edinburgh.

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[*Face p.* 41

THE AQUATIC COLEOPTERA OF THE COUNTY OF ANGUS, WITH A PRELIMINARY LIST FOR THE COUNTY OF KINCARDINE; AND WITH FURTHER REFERENCE TO THE *DERONECTES DEPRESSUS-ELEGANS* COMPLEX.

By Frank Balfour-Browne, M.A. (Oxon et Cantab), F.R.S.E., F.Z.S., F.L.S., F.R.E.S., formerly Professor of Entomology at the Imperial College of Science, London.

(*Continued from* p. 25.)

The *Deronectes depressus-elegans* Complex.

Although my observations upon the *Deronectes depressus-elegans* complex have given me some new facts as to the range of the *elegans* form, I do not feel any nearer the solution of the problem as to whether we have two species which hybridise or one variable species; but I am constrained to criticise the work of Falkenström published in 1932 ([10]) in which he claims to have proved that there are two distinct species and has even gone farther and picked a third, *latescens*, out of the complex.*

My present position is that I have so far found no definite evidence in favour of either view, and after reading a careful translation of Falkenström's paper, it seems to me that he has no evidence of the specific distinctness of the two forms.

* While this paper has been in the press, I have received a further paper by Falkenström upon the metamorphosis of *D. depressus*, F. and *latescens* (*Internat. Rev. Hydrobiologie u. Hydrographie*, 1933, Bd. xxix.), in which, again, specific distinctness of forms is assumed and long descriptions are given of the vague characters upon which the "species" are separated. The author recognises a difference in activity between *depressus* and his species (pp. 188-9). He lays great stress upon the moderate constancy of his "specific" characters, but he mentions a case where the majority of the larvæ of one *latescens* ♀ showed a peculiarity of colouring (p. 199). This might be taken as showing that characters may follow individuals and may not be specific at all. He suggests that chemical tests might be used for separating the larvæ, as he says that *depressus* larvæ keep their colour in 7 per cent. formol whereas *latescens* larvæ fade. Individuals which do not behave as expected are abnormal (p. 199).

In the first place, it is not clear that Falkenström knows the extreme *elegans* form. He mentions (p. 171) that among some beetles sent him was one "which seemed to be *D. elegans*," and on the following page, referring to a specimen, he says: "the insect's underside, however, was not yellow but a darker colour mixed with yellow and therefore it did not agree with the descriptions of *D. elegans*." In the same paragraph he states that Rector Scholz of Leignitz had written to him saying that neither he nor Zimmerman was able to distinguish *D. elegans* from *D. depressus* by the colouring. With this, apparently imperfect, knowledge of *elegans*, Falkenström was able to recognise that his new species *latescens* was "specifically different" from *depressus*.

This author states (p. 183) that two of the figures I gave in my earlier paper on *D. depressus* and *elegans* ([5]) are those of hybrids. The specimens of the former which I figured came from Talkin Tarn, Cumberland, whence, at the time I collected my material in 1915, every male had a broad-apexed ædeagus (Nos. 7 or 8 in the diagram which is repeated from a previous paper ([8])). A single ♂ *elegans* has since been taken from that tarn ([24]), but there is no evidence that any hybrids occurred there fifteen years previously. The ♂ and ♀ specimens of *elegans* which I figured were taken in the river Cam near Cambridge, and no specimens with an ædeagus broader than No. 1 of the diagram have been taken within a hundred miles of that area. Thus there seems to be no evidence that the ♀ specimen I figured is a hybrid.

There is nothing in Falkenström's paper which indicates how he knows that the different forms which he interbred were distinct species, but he seems to assume that, because they interbred and produced intermediates, therefore they were distinct. He suggests that, had I checked my English (British) material by comparing it with authentic specimens of *depressus* and *elegans* from the Continent, I would then have seen that these two "species" have just as stable ♂ copulative organs as the other species of *Deronectes* investigated by me; but he seems to have missed the fact

that I mentioned in my 1915 paper that the forms were remarkably segregated in the different lochs in Galloway. Also in Cumberland, whereas *depressus* (ædeagus, Nos. 7 and 8 in diagram) occupied Talkin Tarn, Tindale Tarn, about three miles distant, only produced specimens at the *elegans* end of the series (Nos. 2 and 3).

I have already mentioned in this paper that in Angus, although forms varying from No. 1 to No. 7 occurred in the area, the extremes never occurred together and with the two exceptions referred to in the 1915 paper, I have never found any marked variation in any one habitat. Why, if there are two distinct species which hybridise, do we so rarely find the parent species with their hybrid offspring? That is the most I can say at present against the view that there are two hybridising species.

Falkenström expresses surprise (p. 183) that I could reconcile myself to the idea "that one and the same species can exhibit such a varying aspect of the penis organ which otherwise is one of the most stable characters in systematics." It is true that the form of the ædeagus is a most useful systematic character, but whether it is correct to say that it is one of the most stable structures seems to depend upon the experience and views of the systematist. At any rate there is plenty of evidence as to its variability within the species. Arrow (*Fauna of British India : Coleoptera, Lamellicornia*, Part ii., 1917, p. 11) says: "When a species forms a compact colony of restricted range, although in colour and other external features it may show great variability, the form of the ædeagus appears to be very constant; but in wide ranging insects the ædeagus is sometimes found to exhibit in different localities differences of form which, when the extremes are compared, are extremely unlike. . . . Such variation, according to my observation, is always geographical and not found in individuals from the same place." He repeats the old idea that this divergence in form would constitute an obstacle to interbreeding and that it is the commencement of the formation of two species out of one and adds, "while the occurrence of considerable variety must not be overlooked, it may be stated as a

general rule that specimens with the same form of ædeagus, although otherwise dissimilar, are conspecific, and that specimens from the same locality with a different form of ædeagus, although they may be otherwise similar, are specifically different." He gives 7 figures (Plate V., figs. 4-10) of the ædeagus of a species *Pachyrrhinadoretus rugipennis*, Chaus., in which the width of the organ is the main variation over its range, which is a very wide one.

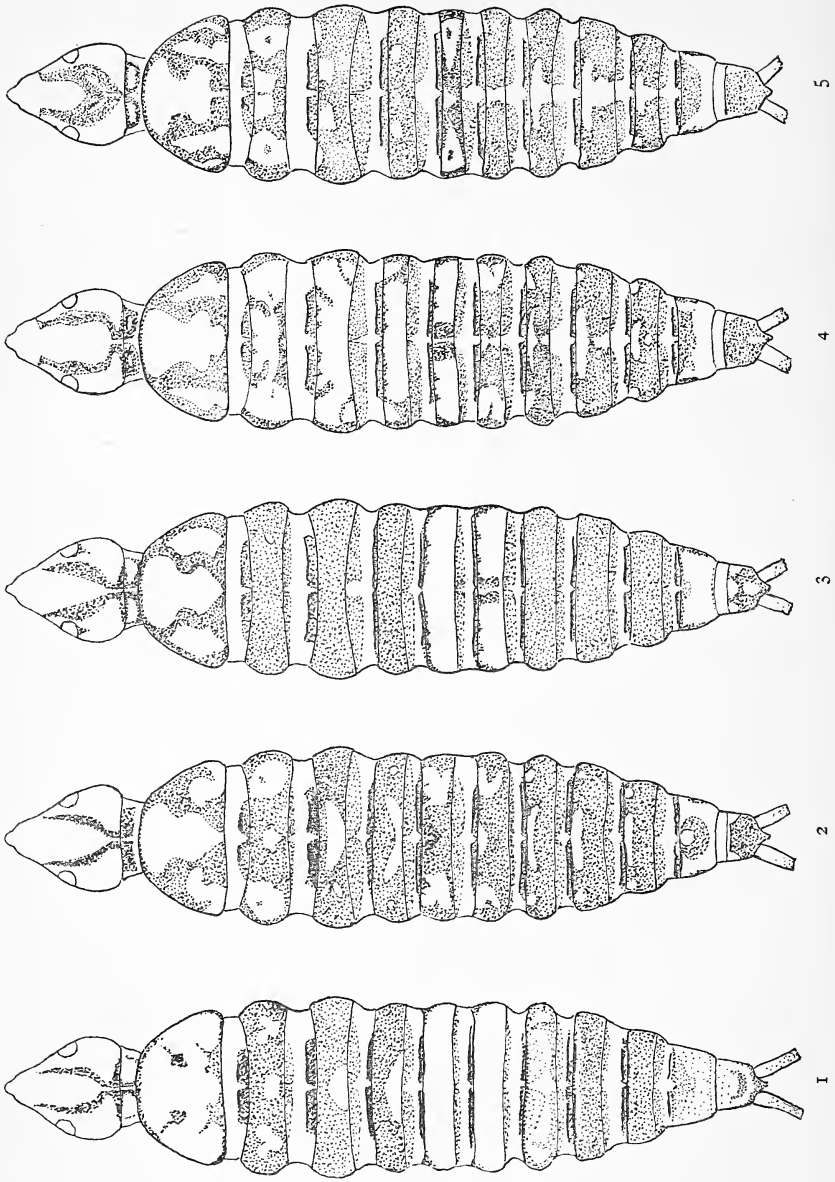
The obsession of so many systematists that the importance of the form of the ædeagus is to prevent intercrossing of species is a very plausible one but is still without any supporting facts, but it is the only view which justifies the statement that differences in the ædeagus, regardless of other characters, usually indicate specific distinctness: the view upheld by Falkenström. Without proof of the prevention of copulation due to variations of the ædeagus, there is no reason at all for regarding this organ as of greater specific value than any other, and yet many systematists rely entirely upon it. A paper by Curti ("Revision der paläarktischen Arten der Gattung Cetonia, s. str.," *Entom. Mitteilungen*, 1913, ii., pp. 340-343) gives on Plates IV. and V., 23 figures showing various forms of the ædeagus of *C. aurata* from various localities, and I have to thank Sir Guy Marshall for calling my attention to this.

Rothschild and Jordan (*A Revision of the Lepidopterous Family Sphingidæ*, 1903) make some remarks in the Introduction which apply here. They say: "We have extreme cases of geographical variation in the copulatory organs, which cases are the more instructive as the races exhibit only slight external differences. . . . It is quite erroneous to say that differences in the sexual armature are always of specific value. Geographical races may be different or not in these organs; and the difference may be minute or conspicuous. It is idle to maintain that geographical representatives are specifically distinct, if their sexual armatures show obvious differences."

It will have been noticed that all the examples I have referred to are those of wide-ranging species and the variations in the ædeagus, or sexual armature referred to by

Rothschild and Jordan, are associated with geographical races. But why should not the same principles apply to isolated habitats within a much smaller area? As has already been pointed out, it is only very rarely that the extremes of ædeagal variation of *depressus-elegans* occur in the same habitat, the range in each such being very small. When the isolated habitats are near together it might well happen that individuals stray from one to another, and it makes the comparative purity of the strain in each habitat the more remarkable. Thus it still seems to me, in spite of Falkenström's comments to the contrary, that it is possible that in this *depressus-elegans* complex we have an organism peculiarly responsive to environment, and it seems possible that there are many other complexes of a similar nature which have been misunderstood because of the belief in the infallibility of the ædeagus, and that there may be more variable species or hybrids than have been suspected.

Falkenström not only endeavours to prove the specific distinctness of the imago of *latescens* but also claims that the larva is easily recognised. He says: (p. 174) "In no other genus of Dytiscids have I so far seen such sharply defined differences between the larvæ of two neighbouring species as those present in" [*depressus* and *latescens*]. It is by no means easy to make out from the descriptions (pp. 174 and 175) what these sharply defined differences are, partly because either the original script or the translation does not make them clear. The matter is further complicated by a statement at the top of p. 175: "I have not yet seen a single larva descended from either ♀ of the two Deronectes forms [*depressus* and *latescens*] which was entirely sufficient to show clearly a specific difference." I have, however, tabulated the characters described, so far as I can make them out, and I cannot find a single one which does not occur in British larvæ of the *depressus-elegans* complex, in which there is every colour variation between the *latescens* pattern and that of *depressus*, as shown on Plate I, figs. C and D of Falkenström's paper. I have made a series of drawings of British larvæ in the third stage, the dotted areas representing clouded parts, the white areas being ground colour of varying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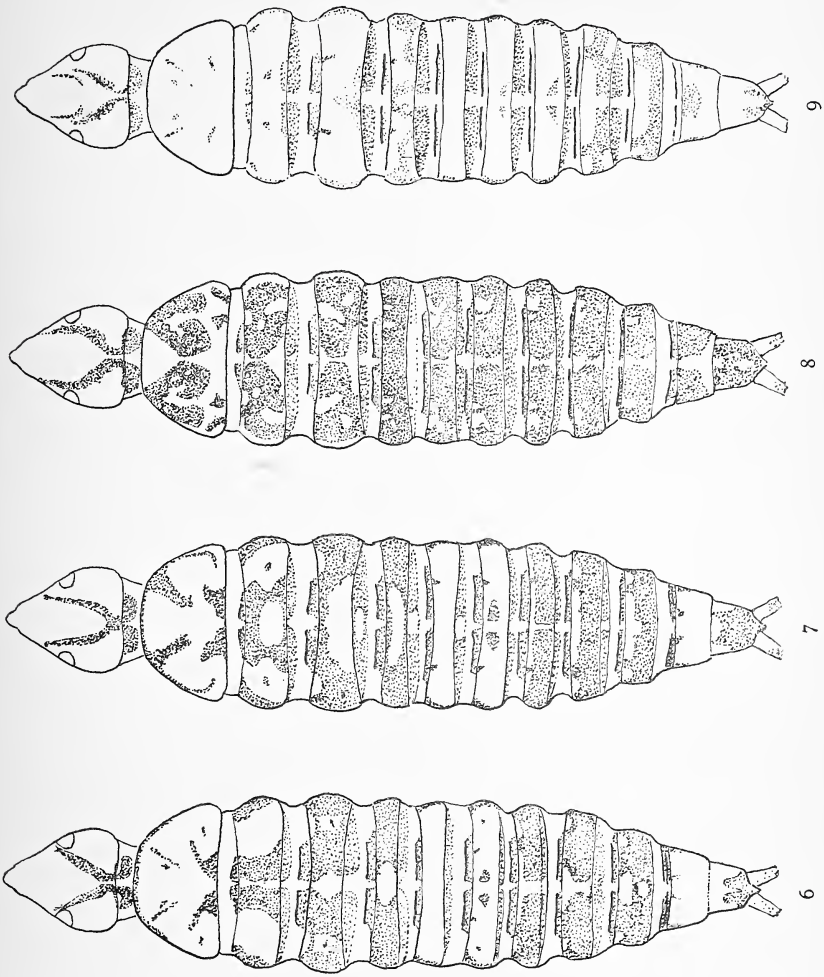

EXPLANATION OF FIGURES.

Drawings of third-stage larvæ of *Deronectes depressus-elegans*, showing the extreme range of marking.

FIGS. 1-3.—The Curling-pond, Edzell, Forfarshire, 5.vii.33. No imagines taken.
FIGS. 4 and 5.—Loch Leven, Kinross, 22.vi.33.
FIGS. 6 and 7.—River Yeo, Somerset North, viii.33.
FIG. 8.—Glenquiech Loch or Pond, Forfarshire, 3.vii.33. No imagines taken.
FIG. 9.—Loch of Lowes, Perth North, 23.vi.33. Imagines with No. 6 ædeagus.

shades of yellow.* Our Plate is a set of photographs of dead larvæ. These larvæ, which have been preserved in spirit, were soaked in water, placed in water in a "compressor" and photographed.

Falkenström admits that in the second stage larva "the colours are almost the same in both forms, and . . . on the whole the colour pattern of *latescens* is a faithful if reduced copy of *depressus* (pp. 175, 176); and he actually suggests that the changes which take place in *latescens* when it passes from second to third stage may be caused by œcological factors—a strange suggestion to account for the third stage when he has tried to show that the first stage colouring of *latescens* is distinct from that of *depressus*.

I have so far not studied first or second larval stages of *depressus*, but the first stage of *elegans* seems to fit into the colour scheme of *latescens*, as described on p. 176.

Falkenström admits (p. 177) that if, instead of finding a single egg-laying ♀ of *latescens*, he had caught a number of imagines, it is very probable that he would have identified them as a strain of *depressus* "differing from the type form in size, colour, pattern, œcology and the like," and that only what he learnt of the metamorphosis precludes that view. To me, at least, he has not made it clear that anything in the metamorphosis proves his case. The fact that the offspring may resemble the particular strain of the parents does not prove that the strain is specifically distinct from other strains; and the fact that he succeeded in crossing the *latescens* strain with the true *depressus* and obtained "a mixture of characters specific to both," is just as good evidence that only one species is concerned as that there are two, and might even be interpreted as rather in favour of the former view.

So far as I can see, the chance of proving which view is correct may lie in breeding some generations of one strain under the habitat conditions of the other. If the one does change into the other then the matter is settled, as it would then be clear that there is but one species and that it is susceptible to environmental conditions. If the strain

* See figures on pp. 46 and 47.

survives under the changed conditions, then the problem still remains unsolved, although the probability of the two species view might be said to be greater. I am at present trying the experiment with the *depressus-elegans* complex.

BIBLIOGRAPHY.

[1] BALFOUR-BROWNE, F., "The Aquatic Coleoptera of the Solway District," *Ann. Scot. Nat. Hist.*, 1909.

[2] BALFOUR-BROWNE, F., "The Aquatic Coleoptera of the Isle of Man," *The Naturalist*, 1911.

[3] BALFOUR-BROWNE, F., "On the British Species of Haliplus, etc.," *Ann. and Mag. Nat. Hist.*, 1915.

[4] BALFOUR-BROWNE, F., "The Aquatic Coleoptera of the Outer Hebrides," *Scot. Nat.*, 1915.

[5] BALFOUR-BROWNE, F., "On *Deronectes depressus*, Fab. and *elegans*, Panz.," *Ann. and Mag. Nat. Hist.*, 1919.

[6] BALFOUR-BROWNE, F., "The Aquatic Coleoptera of the South Ebudes," *Scot. Nat.*, 1923.

[7] BALFOUR-BROWNE, F., "The Aquatic Coleoptera of the Wicken Fen Area, Cambridgeshire," *The Nat. Hist. of Wicken Fen*, Part III., 1926.

[8] BALFOUR-BROWNE, F., "The Aquatic Coleoptera of Caithness and Sutherland, etc.," *Scot. Nat.*, 1930.

[9] CURTI, see p. 44.

[10] FALKENSTRÖM, G., "Stockholmstraktens Vatten-Coleoptera," Part V., *Entom. Tidskr.*, 1932, pp. 171-190.

[11] FORDHAM, W. J., "Yorkshire Coleoptera in 1914," *Naturalist*, 1915, vol. xxix., pp. 231, 232 .

[12] HAMLET-CLARK, "Synonymic List of British Carnivorous Water-beetles," *Zoologist*, 1855, vol. xiii., pp. 4846-4869.

[13] HISLOP, R., "Localities of *Elaphrus lapponicus* and *Agabus congener*," *Zoologist*, 1854, vol. xiv., p. 4956.

[14] LINNELL, J., "Natural History of Reigate and Vicinity (Coleoptera)," 1867.

[15] LITTLE, W., "Localities of Scottish Coleoptera," *Mag. of Zoology and Botany*, 1838, pp. 232-237.

[16] MCNAB, W. R., "Occurrence of *Agabus solieri* near Dumfries and Clova," *Ent. Mo. Mag.*, 1867, vol. iv., p. 283, 288.

[17] MURRAY, A., *Coleoptera of Scotland*, 1853.

[18] MURRAY, A., "Coleoptera," in Wm. MacGillivray's *Nat. Hist. of Deeside and Braemar*, 1855.

[19] MORRIS YOUNG, "Captures of Coleoptera in Renfrewshire," *Entomologists' Weekly Intelligencer*, 1856, vol. i., p. 166.

[20] OMER-COOPER, JOYCE, "Some Notes on Dytiscidæ collected in Northumberland and Durham in 1930," *The Vasculum*, 1931, vol. xvii.

[21] SHARP, D., "Coleoptera of Scotland," *Scot. Nat.*, 1871-1878, vol. ii.

[22] STEPHENS, J. F., *Ill. Brit. Ent. Mand.*, 1824, vol. ii.

[23] THOMPSON, M. LAWSON, "Yorkshire Coleoptera in 1903," *Naturalist*, 1904, vol. xxix., pp. 231, 232.

[24] TOTTENHAM, C. E., "*Deronectes elegans*, Panz., in Talkin Tarn, Cumberland," *Ent. Mo. Mag.*, 1930, p. 233.

[25] WATSON, O. A. C., "Coleoptera in the Aberdeen District" (Kincardine records), *Ent. Mo. Mag.*, 1914, pp. 254, 255.
[26] WILSON, J., and J. DUNCAN, *Entomologia Edinensis*, 1834.

EXPLANATION OF PLATE.

Photographs of larvæ of *Deronectes depressus-elegans assimilis?* and *griseo-striatus*.

FIG. 1.—*Deronectes depressus*, Butterstone Loch, Perth North, 23.vi.33. (Imagines taken at the same time, with ædeagus Nos. 6-8.)
FIGS. 2 and 3.—*Deronectes depressus*, Loch Lee, Forfarshire, 24.vi.33. (Imagines taken at the same time, ædeagus Nos. 6 and 7.)
FIG. 4.—*Deronectes ?*, Loch Leven, Kinross and Fife, 22.vi.33. (Only one ♂ taken and several ♀ ♀. The ♂ is *depressus*, but one individual is not enough to rely upon.)
FIGS. 5 and 6.—*Deronectes elegans*, Montrose Links, Forfarshire, 28.vi.33. (Imagines taken at the same time, ædeagus Nos. 1 and 2.)
FIGS. 7 and 8.—*Deronectes elegans*, Rescobie Loch, Forfar, 26.vi.33. (Imagines taken at the same time, ædeagus Nos. 2 and 3.)
FIG. 9.—*Deronectes elegans*, River Yeo, Somerset North, viii.33. (All imagines with No. 1 ædeagus.)
FIG. 10.—*Deronectes assimilis ?* Stream into Auchintaple Loch, Forfarshire, 1.vii.33. (In stream and loch, only *assimilis* occurred, no *depressus-elegans*.)
FIGS. 11 and 12.—*Deronectes griseo-striatus*, Glen Clova, Forfarshire, 25.vi.33.

Note that plain white bands across a larva, *e.g.* in figs. 3, 4, 9 and 12 especially, are intersegmental membrane only.

Longtailed Duck feeding on Sea Scorpion.—On 11th December I obtained an adult female Longtailed Duck, which had been picked up just dead at St Andrews. The bird had met its death by being choked by a small fish which it had attempted to swallow, and which had stuck at the top of the throat. The fish was a Sea Scorpion—*Cottus scorpius*—and measured three inches in length, the breadth being eleven-sixteenths of an inch across the broadest part of the head.

I am unable to find any reference to the Longtailed Duck as being a fish-eating species. Furthermore, on examining the stomach of the bird, I found quite a considerable number of small fish bones, some of which were facial spines of *Cottus* and which had obviously come from fish not much smaller than the one referred to above. From the number and nature of the bones present, I think there is little doubt that they were from two, or possibly more fish. A further point of interest is that the Longtailed Duck is, of course, supposed to feed in comparatively deep water; while this species of *Cottus* is essentially a denizen of shallow water, although I am not sure of its exact range of depth. I may add that the bird was in excellent condition.—C. R. STONOR, St Salvator's Hall, St Andrews.

BIRD LIFE BY THE ESK AT MUSSELBURGH.

A Few Additions.

By David Hamilton.

In the Scottish Naturalist, September-October 1929 (pp. 157-162) appeared a list of the birds which I had observed by the Esk at Musselburgh. In this list a hundred species were mentioned, and since then I have added other ten to that number. These later observations were made under the same conditions as formerly, namely, confining my attention strictly to the river Esk between Inveresk Church and the sea, mostly during a few spare minutes at midday.

As mentioned in the previous article, from Inveresk Church to the sea by the riverside, the distance is roughly a mile and a half, but a great part of this is through the town of Musselburgh. This reduces the area under observation to less than a mile in length, and all the species have been seen from the river banks. The exceedingly varied conditions prevailing in so small an area make it possible for a number of different types to occur, and the chief interest is not in the rarity of the species seen but in the great variety visiting such a restricted and highly frequented locality. Owing to the latter fact, birds visiting the place seldom stay long, and unless the observer is continually about, the chance of discovery is small.

The following additions to the list are given in the order in which they were observed :—

Razorbill.—On 13th January 1930 a single bird was seen on the water at the mouth of the Esk, the tide being full. It is rather a remarkable fact that this is the only occasion on which I have seen this bird, during all the years I have had the place under observation. At Joppa and Portobello, little more than a mile away, it is often seen close inshore. These remarks apply equally to the Guillemot, a

species I have never yet been able to include in the Esk list. Other observers interested in the district since my first list have had the same experience.

SHELDUCK.—Four adult Shelducks appeared at the river mouth on 18th May 1931, and a single bird was still about on the 25th of that month. During 1933 from 21st August to 6th September several immature birds frequented the mud near the river mouth, so many as five being seen at a time. Shore shooting soon drove them away.

SHOVELLER.—On 27th October 1931, amongst a flock of Mallards which at this season frequent the mouth of the Esk, three Shovellers were seen. Two were males, and they all looked out of place in the rough water, though they seemed very busy feeding.

PINTAIL.—On 25th November 1931, amongst the usual flock of Mallards at the river mouth, a male Pintail was observed. It seemed quite at home on the sea among Gulls and various other Ducks and was continually picking something from the surface of the water. It was seen for several days at midday while the tide was suitable.

On 2nd March 1932 a male Pintail again appeared and was seen on the three days following. At the time of both these appearances, a male Pintail was known to frequent Duddingston Loch, and I came to the conclusion that it was the same bird, and must have flighted from that place to the Esk with the Mallard.

WIGEON.—A single bird seen on 13th September 1932. It was about for three days when it was joined by another. On the 17th of the month a small flock arrived.

Again present during 1933 in the same season.

GREAT SKUA.—Single birds were seen several times during September 1932, off the river mouth. Also

present during the same season in 1933. One bird passing over the river was chased away by a Great Black-backed Gull.

SANDERLING.—A single bird was observed on 1st October 1932 on the left bank at the river mouth. Preferring a sandy shore, this bird is not attracted to the muddy beach at Musselburgh as other Waders are.

POCHARD.—On 15th February 1933 a single male bird was observed at the pool above the salmon ladder, in the Haugh or Grove as the valley of the Esk is locally known. It remained till 7th March and seemed quite tame, and was seen to dive frequently. It possibly was an injured bird, but I feel quite justified in adding it to the list as I have watched for it at the sea for years in vain.

WHITE WAGTAIL.—On 8th May 1933 a small party was seen on the Links at the river mouth, evidently on passage. I did not see them again.

STONECHAT.—A young male bird was seen by the riverside near Inveresk Church on 11th November 1933. This bird has been seen at several places in the vicinity but seems seldom to visit the valley of the Esk.

This completes my list at present, but I am certain that several others will yet be added to the number for this remarkable place.

A few changes which have occurred since my first list may be worth mentioning. The Eider Duck which only once occurred up to 1929 is now very frequent. Flocks of fifty are often observed for days. The Eider seems to be extending its range up the Forth. Local shore shooters have also remarked about the prevalence of this Duck now.

The Kittiwake is now frequently about the mouth of the Esk, and it is interesting to watch how expert this bird is at diving. The Black-headed Gull is fast becoming an expert diver, but the Kittiwakes seem to have acquired the art

already, as they go completely under the surface like the Tern.

Among the Waders and Gulls at the river mouth, several Jackdaws were seen wading in water almost up to their breast feathers, competing with these birds.

Up the riverside the Long-tailed Tits are very frequent and the Kingfisher is often seen.

Two birds one would expect to meet with are the Reed Bunting and the Dipper. The latter bird is numerous on the upper reaches of the Esk, but on this part I have not observed it since 1916. The Reed Bunting, only observed twice, has not occurred since 1923.

The Stock Dove and Tufted Duck have not been seen again since 1929.

Smew in West Lothian.—A female Smew was shot on the river Almond here on 30th December 1933 by my son, Major R. Hog. This is the first time the species has been recorded from West Lothian.—J. H. Hog, Newliston, Kirkliston.

Uncommon Birds on North Uist.—Major C. J. Anstruther tells us that an immature female Great or Solitary Snipe was shot at Balranald, on the west side of the Isle of North Uist, on 11th October 1933. The identification was confirmed by Rowland Ward, to whom the bird was sent. A Pink-footed Goose was shot about the same time on the island of Bernera in the Sound of Harris. This Goose is only an occasional visitor to the Outer Hebrides.—Evelyn V. Baxter and Leonora Jeffrey Rintoul.

Birds at the Isle of May.—There were a good many birds on the Island in early May 1933, quite a lot of Fieldfares, Chaffinches, Bramblings, Redstarts, Willow-warblers, and a few Whitethroats. Three Ortolans were in my garden on 8th May and I also saw a Black Redstart. There was a Pochard drake for some days on the loch and I found a Velvet Scoter dead on the North Ness about the end of March.—John Spence, The Isle of May.

LEPIDOPTERA IN WIGTOWNSHIRE IN 1933.

By Jack G. Gordon.

I was interested in the records of Lepidoptera in Scotland in the Nov.-Dec. number of the Scottish Naturalist, especially in the Tortoise-shell at Newton-Stewart, as I did not see any in the county myself, though I kept a good look-out. Unfortunately I only made a few notes, and was away in England most of July, otherwise I might have procured quite a number of interesting records. However, I give the few that I made, as they may help to make the Scottish records a little more complete. One feature was the splendid condition of almost all the specimens, right up to the end of the season. Incidentally I might mention that my brother, R. S. Gordon, tells me that he saw a good many *P. atalanta* and an occasional *P. cardui* in his garden at Drumblair, Inverness, during June and July.

Red Admiral (*Pyrameis atalanta*).

I can never remember seeing this butterfly so numerous in Wigtownshire, or in such fine condition. Few are seen, as a rule, before September.

Two in garden, Corsemalzie . . . 4th June
Two on island, Castle Loch, Old Place of Mochrum 8th ,,
Several, New England Bay, west side of Luce Bay 9th ,,
Three close to lighthouse, Mull of Galloway . 9th ,,
Three in garden, Corsemalzie . . . 26th ,,
Several in garden, Corsemalzie . . . 2nd July
,, ,, Physgill (Glasserton) . . 6th ,,
Three at Loch Elrig (Mochrum) . . . 10th ,,
Seven in garden, Corsemalzie . . . 9th Aug.
Four in Hensfield, Corsemalzie . . . 12th ,,

Seen in large numbers on heather blossom, etc., on all the moors round Corsemalzie during August.

Seventeen in garden, Corsemalzie . . 22nd Aug.
Many in garden, Tonderghie (Whithorn) . 22nd ,,
Quite twenty in garden, Tonderghie (Whithorn) . 29th ,,
Many in garden, Alticry (Mochrum) . . 30th ,,

Several, Balminoch (Kirkcowan) . . .	7th Sept.
Thirty-three in garden, Corsemalzie . .	6th ,,
Fourteen on Michaelmas Daisies, garden, Corsemalzie	18th ,,
Thirty-four on Michaelmas Daisies (seventeen on one clump), Corsemalzie . . .	19th ,,
Twenty-seven on Michaelmas Daisies, garden, Corsemalzie	21st ,,
Five or six, garden, Culderry (Garlieston) .	1st Oct.
Seven or eight seen at Derrie (Mochrum) .	3rd ,,

The following notes are all from the garden, Corsemalzie, during October:—

11 on 1st	14 on 8th	11 on 20th
23 ,, 3rd	18 ,, 14th	2 ,, 21st
16 ,, 5th	5 ,, 18th	5 ,, 22nd

2 on 24th—the last seen.

Painted Lady (*Pyrameis cardui*).

Uncertain, and generally seen in Autumn. The first noticed was a single one:—

In the garden, Corsemalzie . . .	4th June
Two at New England Bay, west side of Luce Bay	9th ,,
Several near the lighthouse, Mull of Galloway .	9th ,,
Two at Loch Elrig (Mochrum) . . .	12th ,,
Two in garden, Corsemalzie . . .	15th ,,
Several, R. Tarf, Balminoch (Kirkcowan) .	22nd ,,
One down Malzie Burn, Corsemalzie . .	1st July
One Loch Elrig (Mochrum) . . .	10th ,,
One in garden, Corsemalzie . . .	9th Aug.
Three in Hensfield, Corsemalzie on Knapweed .	12th ,,

Seen in small numbers on heather blossom, etc., on all the moors round Corsemalzie during August.

Three near back bridge, Corsemalzie . .	22nd Aug.
Two in garden, Tonderghie, Whithorn . .	22nd ,,
Two in garden, Corsemalzie . . .	6th Sept.
One near R. Tarf, Balminoch (Kirkcowan) .	7th ,,

Small Tortoiseshell (*Vanessa urticæ*).

Saw none about Corsemalzie in 1933, or elsewhere in the county curiously enough, though I kept a good look-out; so was

interested in the note in *Scotsman* of 26th August: Newton-Stewart 23rd August, "There are dozens of the Tortoiseshell Butterfly on the Buddleia in this garden and in our neighbours.' "

Peacock (*Vanessa io*).

A splendid specimen was watched in the garden at Tonderghie (Whithorn) by Miss Harriet and Mr H. Maclean among a number of Red Admirals on the afternoon of the 22nd August. The only other record for the county that I know of, being one seen by myself on a wall by the roadside opposite Crailoch farm, Corsemalzie, so long ago as the 5th September 1898.

Silver-washed Fritillary (*Dryas paphia*).

A single specimen of this butterfly, also very rare in Wigtownshire, was seen and identified by Miss Harriet and Mr H. Maclean curiously enough on the same afternoon in the garden at Tonderghie. The only other being one taken by Mr J. Garroway of Edinburgh, on the roadside at the foot of Alticry Glen, Luce Bay, on the 20th June 1905.

Small Copper (*Polyommatus phlæas*).

Over a dozen were noticed together in the Hensfield, Corsemalzie, on Knapweed on the 12th August. I saw others at various places from time to time.

Large White (*Pieris brassicæ*).

Was quite unusually plentiful about Corsemalzie and neighbourhood in 1933; but unfortunately I kept no dates.

Pale Clouded Yellow (*Colias hyale*).

A single specimen, as far as I know the first for Wigtownshire, was seen near the shore at Sandhead on the west side of Luce Bay by Mr A. C. Brown on the 26th August 1933.

Clouded Yellow (*Colias croceus*).

I did not see any myself, nor have I heard of any being seen in 1933, but there is little doubt that one or two at any rate must have visited us this season, as it has been recorded and captured several times.

Humming-Bird Hawk-Moth (*Macroglossa stellatarum*).

I have seen none in the county for a good many years, but they were noticed in several localities this year.

Two or three on Rhododendron blossom, Corsemalzie	7th June
Two on Bedstraw, New England Bay, west side of Luce Bay	9th „
Five or six seen near the lighthouse at the Mull of Galloway	9th „
Two in garden, Corsemalzie . . .	26th Aug.
One in garden Tonderghie (Whithorn) . .	29th „
One in garden, Alticry (Mochrum) . .	30th „

Humming-Bird Hawk-Moths in Fife in 1933.—A Humming-Bird Hawk-Moth was seen at Balhousie, near Largo, in June, and another visited the Phloxes in a garden in Largo Village on 16th September.—Leonora Jeffrey Rintoul.

Butterflies in 1933.—We have been given notes of very large numbers of Red Admiral Butterflies seen during this summer at Tayfield, Newport, Fife, Balhousie and Gilston near Largo, Fife. The last-named place is 600 feet above sea-level and at all these localities the number of butterflies far exceeded anything seen in previous years. We have also received records of very large numbers of Red Admirals spending the whole summer at Whitslade, near Broughton, Peebles-shire; on 3rd October there were still quite a number of these butterflies hovering about the dahlias in the garden there. A few Painted Ladies were seen at Whitslade during the summer.—Evelyn V. Baxter and Leonora Jeffrey Rintoul.

THE BREEDING BIRDS OF ST KILDA.

By T. H. Harrisson and David Lack, B.A., M.B.O.U.

St Kilda, fifty miles west of the Outer Hebrides, was evacuated by the inhabitants in September 1930, and this isolated island was left unoccupied after some hundreds of years of cultivation, grazing and wild-fowling. In 1931 only three or four sheep remained on Hirta, the main island, where there were once hundreds. The cessation of grazing will modify the heath-moor vegetation, while the former arable land round the village will gradually revert to the vegetation typical of the rest of the island. These changes will in time greatly affect the fauna, and it was with the object of providing a basis for such changes that a party of six from Cambridge visited the island from 22nd July to 14th August 1931, with the kind permission and encouragement of Sir Reginald Macleod of Macleod, the late owner. The party consisted of M. Stewart, geologist, C. P. Petch, botanist, J. A. M. Thomas, mammalogist, John Buchan and T. H. Harrisson, ornithologists, and D. Lack, ornithologist and entomologist.

The main ornithological work was a census of the breeding land birds. This was started on 23rd July and concluded on 27th July, in which time the three ornithologists, walking in line about thirty yards apart, were able to cover the whole of Hirta. The results were plotted on a 6-inch map, with a 25-inch map for the village, where birds were concentrated, and were repeatedly checked on subsequent journeys across the island. As a result we can claim a fair accuracy for the figures obtained, except that the bottoms of the steeper cliffs (which supported a few Rock Pipits) could not be adequately covered. The three outlying islands of Dún, Boreray and Soay were also visited, though T. H. Harrisson, who is alone responsible for the counts on the two latter, had only a few hours on each, so that these counts are necessarily much less accurate. But they are not so important, as it is on Hirta that the main changes

in distribution may be expected to occur. On Hirta a certain number of young had left the nest. In many cases they were still distinguishable from adults, and so could be excluded from the census of breeding pairs. We do not consider the error from this source to be large. The following table summarises the results:—

Species.	Hirta.	Boreray.	Dún.	Soay.	Total.
Raven	1	0	0	0	1
Hooded Crow	3	1	0	1	5
Starling	9	4	1	5	19
Twite	13	1	0	0	14
Tree Sparrow	1 (?)	0	0	0	1 (?)
Meadow Pipit	6	0	0	0	6
Rock Pipit	105	16	19	15	155
Wheatear	10	1	0	0	11
St Kilda Wren	45	3	11	9	68
Peregrine	2	0	0	0	2
Rock Dove	1	0	0	0	1
Common Snipe	3	0	0	1	4
	199	26	31	31	287
	Hirta.	Boreray.	Dún.	Soay.	Total.
Area in acres	1575	189·7	79·4	244·0	2088·1
Density (approx.) 1 pair per	7·9 acres	7·3 acres	2·6 acres	7·9 acres	7·2 acres

The figures in the above table are primarily intended for comparison with future years. But there are a few past records which show that there have been recent changes in numbers among certain species. The Hooded Crow, Starling and Tree Sparrow have apparently greatly decreased (for details see annotated list). Though these are just the species which one would expect to decrease subsequent to the departure of the inhabitants, it is unlikely that so marked an effect could be brought about after only one year. We are gradually learning that bird populations are far from static, and the decreases may have been due to other causes, though possibly assisted by the evacuation. The Razorbill also appears to have greatly decreased. On the other hand, the Rock Dove has returned after an absence of many years.

(*To be continued.*)

CONTENTS

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The Scottish Naturalist

No. 207] 1934 [May-June

THE BREEDING BIRDS OF ST KILDA.

By T. H. Harrisson and David Lack, B.A., M.B.O.U.

(*Concluded from p.* 60.)

Petch (1933) has described the plant associations of the island. The distribution of the land birds was not greatly influenced by these, save in the case of the Snipe, which was confined to the bogs. Probably only here could it feed. The approximate density of the birds is shown in the above table but it is not of much significance, since some areas were devoid of birds while others supported a concentrated population. The small land Passerines (Starling, Twite, Rock Pipit, Wheatear and St Kilda Wren) were especially concentrated round the village area (and to a lesser extent on the lower cliffs). They became scarce or absent on the steep hillsides around, but all save the Twite occurred again on the tops of the hills near the cliff edges. The abandoned arable land was covered in rich vegetation and supported a varied insect life, the steep hillsides being extremely barren in these respects. The distribution of the Twite was perhaps influenced by the greater abundance of food in the village area. This may have played a part in the distribution of the other species, but probably considerations of nesting site provided the main limit to the distribution of these species. Both the village and the cliffs provided numerous rock crevices suitable for the nests of Starling, Rock Pipit, Wheatear and St Kilda Wren. Such sites could not be found on the barren grassy hill-

sides. These four species were also absent from the centre of the North Glen, which had nearly as abundant an insect life as the village area but had no rocks for nesting. The Meadow Pipit, which does not require rocks for nesting, did occur in the North Glen, showing that there was sufficient food there for one Passerine species at least.

It was impossible to estimate the numbers in the enormous colonies of sea-birds. These may become even larger now that the birds are no longer snared for food. The Puffin was the commonest, and where it was most abundant, as on the gently-sloping east side of Dún, the nitrogenous manuring produced by the huge quantities of dung has considerably modified the flora and fauna. On the cliff areas there was an abnormally high and rich growth of cliff plants, in particular the Scurvy Grass (*Cochlearia*) and, where normally one would have expected a development of heath-moor, a flora was found dominated by plants mainly found elsewhere on St Kilda in the abandoned arable land, in particular *Stellaria media* and *Poa annua*, Petch (1933). Among the insects the dominant forms were scatophagous beetles of many sorts and dung-flies (Lack, 1931, 1932). It was perhaps the abundance of these insects that made Dún so attractive to some of the Passerines, which were recorded feeding amid the Puffin colonies. The Passerine density on Dún was greater than anywhere else, save perhaps in the village area on Hirta, which also had an abundant insect life. The Puffin also appeared to be the staple food of the Great Black-backed Gull, and the dead remains of the former catered for further scavenging insects. Hence a large association of animals and plants were dependent on the Puffin.

The following list includes all species known to have bred on St Kilda save for the Great Auk (*Alca impennis*), now extinct, and the Land Rail (*Crex crex*), reported as having bred in 1915 (Clarke, 1915), of which we saw no trace. We have already published an account of the migratory birds observed (Buchan, Harrisson and Lack, 1931). T. H. Harrisson consulted all the important references to birds on the island, and is responsible for all past records

mentioned in this account. The bibliography at the end is not, however, intended to be complete. We are deeply indebted to Dr Cockburn for supplying to T. H. Harrisson additional information on the birds, and also to B. B. Roberts for his great help in reading through the MS. and checking all the references.

Raven, *Corvus c. corax* L.

During August a pair were seen about Hirta. Whether they had bred we could not say, but at least one pair have been recorded as breeding by most previous visitors to the island.

Hooded Crow, *Corvus c. cornix* L.

About three families on Hirta, one on Soay, one on Boreray. A flock of eight (on Hirta) was the largest seen. There has evidently been a large and very recent decrease. This may be due in part at least to the decrease in refuse, etc., consequent on the removal of the inhabitants. Eagle Clarke (1912) noted it as "far too numerous, as many as forty being seen on the wing together" in 1910 and 1911. Cockburn informs us that in 1927 and 1928 there were about ten pairs or more on Hirta, and he saw up to forty together in the village after offal.

Starling, *Sturnus vulgaris* L. (The St Kilda race is uncertain.)

The breeding birds were already in flocks at our arrival. On Hirta about nine families were represented, four in the village and five along the cliffs between Ruaival and the Cambir. On Soay there were about five families, on Boreray four and on Dún one, making a total of nineteen for St Kilda. On the outlying islands the birds often fed among the Puffin burrows, and on Boreray also among the Gannets' nests, where there was an abundance of insect life. In 1911 Eagle Clarke (1912) noted the bird as extremely abundant (on Hirta), and Cockburn informs us that in 1927 and 1928 about 100 pairs bred on the crags of Conachair, the bird being an absolute pest. There has therefore been a very marked recent decrease, perhaps correlated with the removal of the sheep. On North Rona, which, although uninhabited for eighty years, has about two hundred sheep, Harrisson (1931) found about 400 Starlings in 1931, suggesting that the bird may rely on the dung-beetles, etc., occasioned by the sheep.

Twite, *Carduelis f. flavirostris* (L.).

About thirteen pairs and young on Hirta, one other pair on Boreray. It was mainly found round the village, where the

vegetation and insect life were, in 1931, richer than elsewhere. Hence it may be affected in time by the evacuation.

TREE SPARROW, *Passer m. montanus* (L.).

J. N. S. Buchan saw a single Tree Sparrow in the village on 24th July. We saw no others. Previous visitors record the bird as breeding; Eagle Clarke (1912) finding it "not very numerous" and extremely shy though immune from persecution. Cockburn believes, though he cannot be at all positive, that there were none in 1928. Hence the decrease may not have been due to the evacuation. Possibly there was an epidemic. For notes on similar decreases in other Scottish islands *see* Baxter and Rintoul (1928), Stenhouse (1928). The latter refers to the allied House Sparrow (*Passer domesticus* (L)).

WHITE WAGTAIL, *Motacilla a. alba* (L.).

In view of comments of previous visitors, it may be worth noting that we saw no signs of breeding. Migrants were seen from 6th August onward, and, as in Iceland, they frequented the human dwellings.

ROCK PIPIT, *Anthus spinoletta petrosus* (Mont.).

The commonest land bird on all the islands. Our census recorded about 155 pairs for the whole group, 105 on Hirta, 16 on Boreray, 19 on Dún and 15 on Soay. Not only were they nesting round the cliffs, including one pair at nearly 1400 feet on the extreme summit of Conachair, but they occurred abundantly in the village, breeding round the cleits and stone walls, and were more sparsely distributed inland over the rest of Hirta. However, they were absent from the centre of the North Glen, about the only part of the island where the underlying rock was completely covered by vegetation, and were very scarce inland away from the cliffs when above 600 feet. This distribution is of great interest since the bird is normally confined to the shore line, while on St Kilda it occurred at least half a mile from the sea. It is extremely difficult to account for, and the Meadow Pipit, the usual Pipit species found inland, is not unrepresented.

MEADOW PIPIT, *Anthus pratensis* (L.).

Two pairs were breeding in the centre of the North Glen, which, as noted, was not frequented by Rock Pipits. Two other pairs were on the hill sides among Rock Pipits and two further pairs were seen in the village in August and probably bred somewhere on Hirta. The species was not seen on the outlying islands.

Dixon (1885) noted the species as breeding, but subsequent writers discredited this since they found only Rock Pipits. He was presumably correct after all.

Wheatear, *Œnanthe œ. œnanthe* (L.).

About ten pairs on Hirta, one other on Boreray. These were found mainly round the village area and on the cliff edge, a distribution very possibly correlated with the presence there of suitable crevices for nesting.

St Kilda Wren, *Troglodytes t. hirtensis* Seeb.

About 68 pairs were found in 1931, 45 on Hirta, 11 on Dún, 9 on Soay and 3 on Boreray. They were confined to the cliffs save for eight pairs concentrated round the village area, one nest in a cleft on Ruaival and one other in the Great Glen. There seems no reasonable possibility of the extermination of the race. Harrisson is publishing an account of its habits elsewhere.

Peregrine Falcon, *Falco p. peregrinus* Tunst.

We saw two pairs hunting over the island. Cockburn is quoted by MacGregor (1931), p. 164, to have found three eyries in 1928, one on Oiseval, one on Dún and one on Baida Mor. As the last is on Dún there may have been some confusion, and the latter two may refer to the same nest.

Eider, *Somateria m. mollissima* (L.).

Two pairs with young in Village Bay. Cockburn noted about five pairs in 1928. The species has never been abundant.

Cormorant, *Phalacrocorax c. carbo* (L.).

We saw none, though we kept a careful look-out. The early writers, but not recent observers, record it as breeding.

Shag, *Phalacrocorax a. aristotelis* (L.).

There seemed to be about 100 pairs round Hirta, a number more round Soay and Dún, but few round Boreray.

Gannet, *Sula bassana* (L.).

T. H. H. estimated from a boat the numbers on Boreray at 4300 birds, on Stac Lee at 10,000 birds and on Stac an Armin at 7000 birds, making a total of 21,000 adults. How many of these were breeding and how many non-breeding, and how many adults were away feeding, it is impossible to say. Also, owing to the difficult conditions under which the count was made, these figures clearly have an extremely wide margin of error, but Gurney's

(1913) estimate of 30,000 birds is probably too great. Boreray was considered by Gurney the largest colony of Gannets in the world.

Storm Petrel, *Hydrobates pelagicus* (L.).

Noted by others as breeding. We did not locate any. Cockburn found nests in a cave on Carn Mor in 1928.

Leach's Fork-tailed Petrel, *Oceanodroma l. leucorrhoa* (Vieill.).

One found dead on the Cambir. Three nests were found by Lack on Dún. Colonies have been recorded by previous visitors.

Manx Shearwater, *Puffinus p. puffinus* Brünn.

We did not locate the nesting grounds, but recorded one found dead in the Great Glen, others heard at night over the village and two on the sea between Hirta and Boreray.

Fulmar, *Fulmarus g. glacialis* (L.).

Extremely abundant, and second only to the Puffin. It was considerably more numerous than Lack found it in the Iceland colonies on Grimsey and the Westmann Islands, and even than on Bear Island (near Spitsbergen). According to Ritchie (1930) the species greatly increased on St Kilda after the introduction of tinned food to the islanders and the consequent decrease in the number of Fulmars taken for food.

Rock Dove, *Columba l. livia* Gm.

Five frequented Oiseval during our stay, all of which seemed typical of the wild form and had presumably bred. Early writers up to Dixon (1885) note the species as breeding in small numbers, but Elliott (1895) found none in 1894, nor did subsequent visitors record it until 1931.

Oystercatcher, *Hæmatopus o. ostralegus* L.

About seventeen pairs on Hirta and a few on the other islands. These were round the shore save for one pair in the North Glen.

Curlew, *Numenius a. arquata* (L.).

Noted on migration, but none gave evidence of breeding. However, Alec Fergusson and Findlay MacQueen both gave us, independently, good accounts of nesting in the Great Glen in former years; hence, though there are no proved records for the Outer Hebrides, it is possible that the species breeds on St Kilda, as suspected by Dixon in 1884.

Whimbrel, *Numenius p. phæopus* (L.).

Several writers have noted it as probably breeding, but we saw none.

Common Snipe, *Capella g. gallinago* (L.).

Three pairs bred on Hirta, one on Soay. Young were found on the top of Conachair, on Mullach Mór and in the Great Glen. They were restricted to the bogs, and hence to the high ground.

Common Gull, *Larus c. canus* (L.).

MacGillivray (1840) and Milner (1848) record a few nests, but subsequent visitors, including ourselves, have only seen odd birds, and found no signs of breeding.

Herring Gull, *Larus a. argentatus* Pont.

Moderate numbers (about fifty pairs on Hirta) were found nesting along the cliffs, and adults, probably non-breeding, were found in flocks on the Village and Glen Bay beaches.

Lesser Black-backed Gull, *Larus fuscus grællsii* Brehm.

In 1931 one pair bred on the cliffs east of Glen Bay. Eagle Clarke (1912) was told by Neil Fergusson that a nest had recently been found. Most visitors did not see the bird, but it was recorded by MacGillivray (1840), Milner (1848) and Eagle Clarke (1912). Dixon (1885) stated that it bred in considerable numbers on Dún in 1884, but this statement seems doubtful in view of the other evidence. Considering the abundance of this species in most of the Outer Hebrides, its present scarcity on St Kilda is remarkable.

Great Black-backed Gull, *Larus marinus* (L.).

Pairs at intervals round the cliffs on Hirta, Dún and Boreray, rather less numerous than the Herring Gull. There were also non-breeding adults in Village and Glen Bays, about fifty in all.

Kittiwake, *Rissa t. tridactyla* (L.).

Colonies of moderate size on the steep lower parts of the cliffs. As with other gulls, flocks collected in Village and Glen Bays. Presumably these were non-breeding birds, though many were in adult plumage.

Razorbill, *Alca torda* (L.).

About twelve pairs were nesting at the east end of Dún. One other was observed between Boreray and Hirta. This was all we

saw, despite careful search. In 1928 Cockburn noted some breeding on Stac Levenish, which was not visited by us. The bird has evidently decreased, since Eagle Clarke (1912) noted in 1911 that it was a very common breeding species, and he saw many at sea, especially off Boreray, in October.

GUILLEMOT, *Uria aalge* (Pont.).

Not uncommon, most colonies, like those of the Kittiwake, being on the steep lower parts of the cliffs. We saw only two var. *rhingvia*, but in a photograph of thirty individuals on Levenish by Cockburn, three are of this form.

BLACK GUILLEMOT, *Uria g. grylle* (L.).

We found pairs in Dún passage (two), Glen Bay (one), Bradastac (one), Oiseval (one) and Sgeir Mhor (one).

PUFFIN, *Fratercula arctica* Brehm.

By far the commonest bird on the island, nesting everywhere on the upper parts of the cliffs, and also on the more inland slope forming the west side of Glen Bay.

REFERENCES.

RESULTS OF THE 1931 PARTY.

1932. BUCHAN, J., T. H. HARRISSON and D. LACK, "The Early Autumn Migration at St Kilda in 1931," *Scot. Nat.*, Jan. 1932, pp. 3-8.

1931. HARRISSON, T. H., "A Visit to St Kilda in 1931," *Bull. B.O.C.*, vol. iii., pp. 32-36.

1933. HARRISSON, T. H., and J. A. MOY-THOMAS, "The Mice of St Kilda, with Especial Reference to their Prospects of Extinction and Present Status," *Journ. Animal Ecol.*, vol. ii., No. 1, May 1933, pp. 108-115.

1933. HARRISSON, T. H., "Counts of Gannets (*Sula bassana*) in Scottish Islands," *Journ. Animal Ecol.*, vol. ii., No. 1, May 1933, p. 116.

1931. LACK, D., "Coleoptera on St Kilda in 1931," *Ent. Monthly Mag.*, vol. lxvii., pp. 276-279.

1932. LACK, D., "Further Notes on Insects from St Kilda in 1932," *Ent. Monthly Mag.*, vol. lxviii., pp. 139-145.

1932. LACK, D., "Notes on the Diptera of St Kilda," *Ent. Monthly Mag.*, vol. lxviii., pp. 262-266.

1932. PETCH, C. P., "Additions to the Flora of St Kilda," *Journ. Botany*, pp. 169-171.

1933. PETCH, C. P., "The Vegetation of St Kilda," *Journ. Ecology*, vol. xxi., pp. 92-100.

OTHER REFERENCES.

[N.B.—*Only the more important information on Birds has been referred to.*]

1884. BARRINGTON, R. M., "The St Kilda Wren," *Zoologist*, 3rd Series, vol. viii., pp. 383-385.

1928. BAXTER, E. V., and L. J. RINTOUL, "Decrease of Tree Sparrows," *Scot. Nat.*, p. 25.
1910. BEDFORD, DUCHESS OF, "On Visits paid to the Island of N. Rona," *Ann. Scot. Nat. Hist.*, pp. 212-214.
1914. BEDFORD, DUCHESS OF, "Spring Bird-Notes from various Scottish Islands," *Scot. Nat.*, pp. 173-181.
1885. DIXON, C., "The Ornithology of St Kilda," *Ibis*, 5th Series, vol. iii., pp. 69-97, 358-362.
1886. DRESSER, H. E., "On the Wren of St Kilda," *Ibis*, 5th Series, vol. iv., pp. 43-45.
1912. EAGLE CLARKE, W., *Studies in Bird Migration*, London, vol. ii., pp. 183-249.
1915. EAGLE CLARKE, W., "The Wren of St Kilda; its Status, Plumages and Habits," *Scot. Nat.*, pp. 291-296.
1915. EAGLE CLARKE, W., "Corncrake at St Kilda," *Scot. Nat.*, p. 333.
1895. ELLIOTT, J. S., "Observations on the Fauna of St Kilda," *Zoologist*, pp. 281-286.
1913. GURNEY, J. H., *The Gannet, a Bird with a History*, London, pp. 116-150.
1932. HARRISSON, T. H., "Resident and Migratory Birds of North Rona, the Remotest Scottish Island," *Ibis*, 13th Series, vol. ii., No. 3, pp. 441-457.
1888. HARVIE-BROWN, J. A., and T. E. BUCKLEY, *A Vertebrate Fauna of the Outer Hebrides*, Edinburgh.
1897. KEARTON, R., *With Nature and a Camera*, London, pp. 1-134.
1764. MACAULAY, K., *The History of St Kilda*, London.
1840. MACGILLIVRAY, J., "An Account of the Island of St Kilda, chiefly with Reference to its Natural History, from Notes made during a Visit in July 1840," *Edinburgh New Philosoph. Journ.*, vol. xxxii., pp. 47-70.
1931. MACGREGOR, A. A., *A Last Voyage to St Kilda*, London.
1905. MACKENZIE, N., "Notes on Birds of St Kilda," *Ann. Scot. Nat. Hist.*, 1905, pp. 75-80, 141-153.
1698. MARTIN, M., *A Late Voyage to St Kilda the Remotest of all the Hebrides or Western Isles of Scotland*, London.
1928. MATHIESON, J., "St Kilda, with Notes on Geology by A. M. Cockburn, on the Flora by J. Gladstone, and on the Birds by S. Gordon," *Scottish Geograph. Mag.*, vol. xliv., pp. 65-90.
1930. RITCHIE, J., "St Kilda and the Significance of some of its Animal Inhabitants," *Scot. Nat.*, pp. 69-74.
1884. SEEBOHM, H., "On a New Species of British Wren," *Zoologist*, 3rd Series, vol. viii., pp. 333-335.
1928. STENHOUSE, J. H., "Remarkable Decrease of the House Sparrow in Fair Isle and Shetland," *Scot. Nat.*, pp. 162-163.
1905. WATERSTON, J., "Notes on the Mice and Birds of St Kilda," *Ann. Scot. Nat. Hist.*, pp. 199-202.
1903. WIGGLESWORTH, J., *St Kilda and its Birds*, Liverpool.

NOTES

Orkney Grass Mouse in Neolithic Burial.—Associated with a neolithic burial found near the broch at Mid Howe in Rousay, Orkney Islands, were found several fragments of the skulls of small rodents. They include the palatine portion of four skulls, two of which possess part of the zygomatic arch, and two rami of lower jaws. The broad build of the upper portions of the skulls and particularly the characters of the molar teeth, in the second upper individual of which the enamel ridges exhibit only one closed triangle on the inner side, show that the fragments belonged to the Orkney Grass Mouse, *Microtus orcadensis*. The fragments are not sufficient to determine whether they belonged to the Rousay race of that species, but their presence with a neolithic burial suggests their occurrence in early prehistoric times, provided it can be assumed that the mice did not gain access to the burial in later, even recent, times; such access would be unlikely if the burial were at some depth in solid soil.—James Ritchie, Aberdeen University.

[Dr J. Graham Callander informs us that these bones were found "from the neolithic floor level up to a foot above it."—Eds.]

Probable Nesting of the Red-backed Shrike in Midlothian.—On seeing a letter in the *Scotsman* describing a nest found in a hedge in a garden at Blackshiels we communicated with the writer, Mrs Robertson, who very kindly asked us to go there and see it. This we did and found a typical Shrike's nest in a straggly thorn hedge and, hanging on thorns, under the nest three skeletons of small birds. Mrs Robertson told us that, in 1932, she saw a bird "sitting, bowing as it were on a wooden fence running down from the hedge not far from the nest, but it flicked away as I came nearer." She particularly noticed the movement of the tail and the grey in the bird's plumage; she described the bird as a thick bird and the tail not very long. The hedge where the nest was found had not been cut for three years at least; it is about ten feet high and the nest was high up among the branches. Mrs Robertson says "the mild season accounts for the leaves having remained on the hedge much longer than usual else we might have made the discovery of the nest earlier." In view of the site and appearance of the nest, the skeletons hanging on thorns, impaled under the chin in typical Shrike fashion, and from the description of the bird, this would appear to be without doubt the nest of a Red-backed Shrike.—Evelyn V. Baxter and Leonora Jeffrey Rintoul, Largo.

NOTES ON THE STATUS OF BIRDS IN SCOTLAND IN 1933.

By Leonora Jeffrey Rintoul and Evelyn V. Baxter.

Each year we publish in the Scottish Naturalist additions and corrections to be made in our book on *The Geographical Distribution and Status of Birds* in Scotland, in order that it may be kept up to date.

We are glad to say there was a good deal added to knowledge of Scottish birds by work done and published in 1933, and, in consequence, a considerable number of changes to be made in their distribution and status. Very interesting results are beginning to accrue from birds ringed in Iceland, and fresh evidence of the instability of the status of species is also valuable.

One new bird has been added to the list, namely, a Bartram's Sandpiper, which was shot on 13th October 1933, on the farm lands of Kirkstyle, Ruthwell, Dumfries. A new page should therefore be headed "Bartram's Sandpiper, *Bartramia longicauda* (Bechstein). A very rare visitor"; and "O xvii. xxvii. 205" added to Dumfries.

The following additions and alterations should be made under the various divisions:

Starling, *add* "W" to Banff.

Brambling, *delete* "has bred Monar?" and *insert* "Has bred" to East Inverness. This refers to the record in *British Birds* (*Mag.*) from Tomdoun which was recorded as from West Inverness. This place is, however, in the Faunal Area of Moray and therefore in E. Inverness.

Little Bunting, *add* "O" to Outer Hebrides xii. 1933.25.

Red-backed Shrike, *add* "O" to West Ross.

Waxwing, *add* "O" to the Isle of May.

Pied Flycatcher, *add* "O" to West Lothian and Kinross.

British Song Thrush, *add* "W" to Aberdeen.

Black Redstart, *add* "O" to S. Inverness.

Short-eared Owl, *add* "Has bred" to Renfrew.

Barn Owl, subsp.? *add* "*O*" to Orkney.

Marsh Harrier, *add* "O" to Wigtown.

Heron, *add* "W" to Kinross.

American Bittern, *add* "O" to the Outer Hebrides xii. 1933.92.

Bean Goose, *add* "O" to Bute.

Mallard, *add* "W" to Dumbarton.
Garganey, *add* "O" to the Isle of May.
Eider, *add* "O" to Arran.
Great Shearwater, *add* "O" to the Isle of May.
Great Crested Grebe, *add* "O" to W. Ross.

An interesting point brought out by the Great Crested Grebe Enquiry, by T. H. Harrisson and P. A. D. Hollam, is that the Great Crested Grebe has ceased to breed in several counties where it formerly nested. The correct status therefore for Berwickshire, Selkirk, Morayshire, now seems to be "used to breed." *Delete* "O S Has bred" and *substitute* "S" in Aberdeen, *add* "R" to Clackmannan, *delete* "Has bred" and *substitute* "R" in West Lothian.

Black-necked Grebe, *add* "O" to South Inverness.
Northern Golden Plover, *add* "O" to the Outer Hebrides.
Lapwing, *add* "S" to Midlothian.
Dunlin, *add* "R" to West Ross.
Iceland Redshank, *add* "O" to Orkney xvii. xxvii. 359.
Greenshank, *add* "O" to Kinross.
Woodcock, *add* "W" to North Kincardine.
Little Gull, *add* "O" to Midlothian.
British Lesser Black-backed Gull, *add* "Has bred" to the Isle of May.
Northern and the Southern Guillemot, *add* "O" to Arran.
Quail, *add* "Has bred" to Forfar and "O" to the Isle of May.

Iceland Gull in Clyde.—On 23rd March, while waiting at Prince's Pier, Greenock, and until the steamer left, I had under observation an Iceland Gull in immature plumage of a pale grey colour with white flight feathers. Seven species of gulls were seen together. For some weeks past a few Kittiwakes had been about this part of the river, the young birds with black bars along wings usually attracting attention first, and one or two of these were still present. There were two Great Black-backed Gulls and several of the Lesser Black-backed only lately arrived in the Clyde for the summer. I saw them first at Renfrew Ferry and Glasgow on 12th March. A large party of Herring Gulls and some Common and Black-headed Gulls made up the rest of the company. Various plumages were represented as the changing season was not quite past. As the steamer was leaving some refuse was thrown out and the whole assemblage gathered alongside, so that I had a splendid view of the Iceland Gull and noted the size compared with the Herring Gulls, one of which pecked at it to drive it off, and the beautiful white wing-ends were especially noticeable when raised or in flight.—T. Malloch, Kilmun.

In Memoriam.

FREDERICK WILLIAM SMALLEY, F.Z.S., M.B.O.U.

On the 21st December 1933 Ornithology suffered a severe loss by the death of Mr Frederick William Smalley, of Edenbreck, Lancaster. Educated at Rugby and Wadham College, Oxford, Mr Smalley was a Fellow of the Zoological Society of London and a member of the British Ornithologists' Union. He was a valued contributor to our pages, and so recently as May-June last year we published an interesting note by him on "Colour Variation in Mammals." Although a naturalist of wide sympathies he specialised in Birds and Mammals, and amassed an exceptionally fine collection of Palæarctic Birds, which comprised considerably over 4000 specimens. This collection has been on loan in the Royal Scottish Museum for many years, and now, by his generous and patriotic bequest, it has become the property of this Museum, and consequently of the nation. Mr Smalley took an active interest in the breeding of bantams and pigeons, and was for many years a director and latterly chairman of the Crystal Palace Grand International Show.

The Smalley collection of Palæarctic Birds is a magnificent gift, and is particularly rich in Ducks and Waders in many different stages of plumage. In these groups Mr Smalley was one of the leading authorities. He was also a keen student of British Rodents, of which he got together a large and useful collection. On the advice of Mr H. W. Robinson, an old friend of Mr Smalley, his executors generously presented this collection to the Royal Scottish Museum. It is interesting to note that many of the specimens in Mr Smalley's collections were obtained in Scotland, mainly in Orkney, the Solway Firth, and the Firth of Clyde.

The Coming of Man: Was it Accident or Design? By R. BROOM, F.R.S. London: H. F. and G. Witherby, 8vo, 238 pages, 36 text figures and frontispiece, 1933. Price 10s. 6d. net. The title of this fascinating volume sets forth an interesting problem which will probably never be solved. Nevertheless, as the author says, "if we can catch even a few glimpses of light it may help us considerably." The object of the book is to place before the reader the main facts regarding evolution, and whether the reader's conclusions agree with those of the author or a different view be taken, he will, after studying the evidence so clearly put forth in these pages, at least be in a much better position to judge the problem. Leaving out of consideration the evolution of the invertebrates and the actual origin of the vertebrates, both of which subjects are so uncertain, the progressive series of changes from fish to man are dealt with in a very readable fashion, and then follows the question of the possibility of a spiritual agency—a supreme intelligence—as the prime force which has, so to speak, guided the course of these evolutionary changes. The author himself confesses that he can trace intelligence behind it all, and definitely rules out the idea that evolution has been a "succession of fortuitous mutations." It is not possible to argue the question in this place: all we can do is to recommend to our readers a careful perusal of this well-written volume, which is of intense interest, attractively printed and appropriately illustrated.

Creation's Doom. By DESIDERIUS PAPP. Translated by H. J. Stenning. London: Jarrolds, 1934, 8vo, 286 pages, 8 plates and 17 text figures. Price 12s. 6d. net. This is a fascinating volume, which will be read with mingled feelings of interest, horror, and hope. Recounting the various stupendous happenings in the immeasurable realms of space, in which our tiny earth revolves as a microscopic unit, some idea is given of what might possibly happen at any moment, should our sun collide with another star. Such things have happened to the certain knowledge of our astronomers, and there is always a possible chance that our solar system may come within the attractive force of another system, the result being instantaneous annihilation! But this *may not* happen for billions of years to come, and by that time man must have evolved into some other state or have become extinct altogether. What will man be like in a few more millions of years? Probably toothless, hairless, with a super-brain and untold-of new senses. We may be able to distinguish the chemical qualities of substances (*e.g.* poisons) by a mere touch, or by some sort of spectroscopic eye tell at a glance what elements are present in the stars; we may have the power of thought transference or thought reading and exchange ideas by mere etheric vibrations; we may even be able to communicate with each other over any distance by means of an organic transmitter and receiver of wireless waves developed in each of our brains! Such are a few of the possibilities discussed in the volume before us, a book which though reading like a fantasy, is yet written with consistent logic throughout.

PARASITES OF WEEVILS OF THE GENUS *SITONA*.

By Dorothy J. Jackson.

In the course of biological studies on weevils of the genus *Sitona*, the following parasites have been observed, in addition to those already recorded in my papers.

Nematode.

Amongst a number of weevils of *Sitona lineata* L., collected by Mr B. S. Harwood at Sudbury, Suffolk, on 14th April 1925, and forwarded to me at St Andrews, a male was found on 6th May 1925 to be newly dead. The abdomen was swollen so that the elytra were slightly parted and the propygidium and pygidium were exposed. On dissection a parasitic worm was found coiled and twisted about within the host, filling up the abdominal cavity and projecting into the thorax. The worm appeared to be recently dead, but was in good condition. It measured 42·5 mm. long by 0·18 mm. broad, more than eight times the length of the weevil. The body of the host was a mere shell, lined with tracheæ. The tissues were greatly emaciated, no fat body remained. The alimentary canal and reproductive organs appeared to be intact, but the testes and accessory glands were very small. The testes were teased up in normal salt solution and two or three spermatozoa only were detected. On the advice of Dr K. G. Blair the worm was submitted to Dr H. A. Baylis, who stated it was an immature *Mermis*.

Dipteron.

A number of weevils of *Sitona hispidula* F., collected for me by Mr H. F. Hudson at Strathroy, Ontario, about the middle of August 1928, were brought alive to St Andrews. I killed one of these weevils on 4th October 1928, fixing in Bouin's fluid for about two hours. On dissection, a dipterous larva was found occupying the greater part of the hæmocoele

of the metathorax and abdomen. The larva, which measured 1·99 mm. long by 0·8 mm. broad, was examined by Dr W. R. Thompson, who stated it was a Tachinid. This, as far as I am aware, is the first record of a dipterous parasite of *Sitona*. No other specimens were obtained from the Canadian weevils, though many were dissected, and I have never met with it from *Sitona* collected in this country.

PROTOZOA.

At various times clusters of minute spore-like bodies have been found in the gut and in the Malpighian tubules of *Sitona hispidula*, both in recently emerged specimens and in those kept long in captivity. They have been examined by Professor D. Keilin, who considers them to belong to the genus *Mycetosporidium* Léger. The weevils infected with them appeared to be otherwise healthy.

Another Protozoan parasite, producing a most striking condition in the host, was obtained from a weevil of *S. lineata* collected near Storrington, Sussex, in the beginning of November 1932. The weevil was killed on 17th November, and on removing the elytra it was noticed that the whole abdomen was greatly swollen, so much so that the pale intersegmental membranes were fully exposed. Expecting to find a large Braconid larva I dissected the specimen with care, and found to my surprise that the body cavity was filled up with opaque white matter, which was present in such masses as to be the entire cause of the distended abdomen. This substance readily broke up into irregular lumps when touched with the dissecting needles. At first sight it appeared like a monstrous development of fat body, though its colour differed from the pale translucent faintly yellow tint of normal fat. On mounting a small portion of this substance in salt solution, it was seen to be composed chiefly of myriads of minute oval bodies about 5 μ in length. These streamed out into the surrounding fluid when the mass was prodded. The lumps, when unbroken, exhibited distinct lobes and, when mounted, a limiting membrane could be discerned in places. In stained preparations where the lumps were broken and in consequence less dense

(through the dispersal of some of the organisms) nuclei, like those of the fat body, could be discerned, from which I conclude that the organisms had invaded the fat body and there multiplied, distending it far beyond its normal proportions. The internal organs of the weevil were quite emaciated and no normal fat was observed. The material was submitted to Professor Keilin, who thinks that the parasite is a Microsporidian. Although large numbers of *Sitona lineata* have been dissected from many British localities at all times of the year, this condition has never been observed before. From this it is evident that the parasite must either be uncommon, or rarely present in weevils to such a noticeable degree.

FUNGI.

On various occasions in October (1921, 1924 and 1927), when I had collected *Sitona* weevils in the north of Scotland by sweeping clover, I found, on examining the specimens a day or two afterwards, that one or more were dead in a life-like position, with legs extended as though resting naturally; in fact, such specimens were sometimes mistaken for living weevils. From the dead weevils a yellowish coffee-coloured fungus made its appearance. It grew out at various points, principally from the segmental divisions and between and around the edges of the elytra, while rhizoids issuing from the ventral surface anchored the weevil firmly to the substratum. The rhizoids were observed to arise principally at the junction of the metasternum with the abdomen, but in one specimen an additional group issued from between the prosternum and the mesosternum. In some specimens the whole dorsal surface of the abdomen becomes enveloped in the fungus, which may extend in a solid mass round the sides of the abdomen encasing the legs. The elytra may be thrust apart and in two weevils one elytron was missing, evidently pushed off by the growth of the fungus. The fungus developed externally with great rapidity; a weevil alive one day would be dead and partially covered with fungus in twenty-four hours. If placed in a damp situation, within two days of its appearance the fungus became covered

with a glistening white dusting, the spores, which were also scattered like powder around the beetle. Specimens of *Sitona hispidula*, *S. sulcifrons* Thun and *S. flavescens* Marsh were affected in this way and were collected at various localities in the east of Ross-shire; this fungus was also observed on *S. flavescens* collected near Elgin and near Wick. The fungus-killed weevils were kept in glass-topped tin boxes, and other weevils put with them readily contracted the affection, so that a supply of fungus-killed weevils was obtained one year from the middle of October till the end of December. The specimens were submitted to various mycologists, but the identity of the fungus remained obscure till Mr T. Petch examined them recently. The specimens sent him were those collected near Wick in October 1927, and he states that the fungus is *Entomophthora coleopterorum* Petch, a species which he described last year from a beetle near King's Lynn.

While this fungus would appear to be fairly prevalent in the north of Scotland, I have not found it to be nearly as common as *Beauveria* (*Botrytis*) *Bassiana* (Bals), the *White Muscardine*, which I have already recorded (1920, 1922) from various *Sitona* weevils.

I have occasionally found dead larvæ and pupæ of *Sitona* partially or entirely covered by a green fungus. It has been identified by Miss E. M. Wakefield as *Metarrhizium Anisopliæ* (*Metsch.*) *Sorok*, the Green Muscardine, and recorded by Mr Petch (1932). I have observed it from July to September. It has developed both on larvæ reared in captivity and on those dug up from roots of clover in fields, at Wye, Kent, and near Evanton, Ross-shire. The species affected were *S. lineata*, *S. hispidula*, *S. flavescens*, *S. puncticollis* Steph. and *S. crinitus* Herbst. Attempts to infect adult weevils with this fungus proved unsuccessful, either when the spores were painted on the weevils or spread on a leaf which the weevils ate. Experiments with larvæ were rather more promising. Several apparently healthy larvæ were painted with spores; some of these died and from most of the dead larvæ the Green Muscardine developed subsequently.

REFERENCES.

JACKSON, D. J., 1920-22, "Bionomics of Weevils of the Genus *Sitones* injurious to Leguminous Crops in Britain," *Ann. App. Biology*, vii., pp. 269-298 ; ix., pp. 93-115.

JACKSON, D. J., 1928, "The Biology of *Dinocampus* (*Perilitus*) *rutilus* Nees, a Braconid Parasite of *Sitona lineata* L.," *Zool. Soc. London*, No. xl., pp. 597-630.

PETCH, T., 1932, "A List of the Entomogenous Fungi of Great Britain," *Trans. Brit. Mycolog. Soc.*, xvii., Part III., pp. 170-178.

Unusual Number of Rooks in North Uist.—For the last four weeks a party of 30 Rooks has been frequenting some potato ground a short distance from the house. I have seen Rooks several times in Uist, but never more than two or three together.—GEORGE BEVERIDGE, Vallay, Lochmaddy, N. Uist.

Goosander in Orkney. — As the Goosander is not often recorded from Orkney, it may be of interest to state that one was washed up on the Island of Sule Skerry in mid-October 1933. It was a male and had only recently died, being still warm when picked up. One in my collection was shot among the evening flight of Mergansers into Loch Stenness at the Bridge of Waith on 4th December 1906. It also was a male.—H. W. ROBINSON, Lancaster.

Unusual Assemblage of Great Crested Grebes in Forth. —On 3rd February 1934, when we were watching birds in the Firth off Culross, Fife, we were surprised to see Great Crested Grebes flying up the Firth in large numbers. Many of them alighted on the water quite close to us and we had an excellent opportunity of examining the birds at close range, every one of which was a Great Crested Grebe. We have never seen anything approaching this number of Great Crested Grebes and at first, when seeing them flying past, could hardly believe our identification to be correct; but when they came near and alighted on the sea we were able to establish their identity beyond all doubt, and are sure there were at least 500 birds there. It seems certain that these cannot all have been our own birds; it is possible that the very cold weather in England, while it is mild and genial here, may have resulted in unusual movements on the part of the Grebes, or they may of course have been birds from the Continent. The day on which we saw them was very still, sunny and warm.—EVELYN V. BAXTER and LEONORA JEFFREY RINTOUL, Largo.

All the Other Children. A Book of Young Creatures. By C. FOX SMITH. London: Methuen & Co., Ltd., 1933, 4to, 100 pages and 51 full-page illustrations. Price 7s. 6d. net. Children are lucky nowadays in having books like that now before us for their education and amusement. In this charming volume will be found a series of delightful photographic studies portraying the young of all kinds of creatures, mammals, birds, reptiles, fishes and insects, in the majority of cases accompanied by their mother and depicted with artistic and appropriate surroundings. Opposite each picture is a page of beautifully printed text, which tells the child just what he would like to know, in simple and well-chosen language. Of the illustrations we cannot speak too highly. The portraits of the bloodhounds, the zebras, the goat and kids, the lion cubs and the family of hedgehogs may be cited as particularly pleasing.

Plants and Human Economics. By RONALD GOOD, M.A. (Cantab.). Cambridge: at the University Press, 1933, 202 pages, with 8 maps. Price 5s. There is an astonishing amount of information in this very moderate-sized book, and yet the text is written in such a way as to be most interesting and readable. Five introductory chapters form a most valuable introduction to the study of botany and its economic relations to man, while the following chapters deal with the various groups of plants more in detail. Cereals, Vegetables as food, Beverages, Timbers, Rubber and Alcohol are among the subjects discussed in full. A short reference list of more advanced books is given on p. 175, and this is followed by a combined list and index of the very numerous plants mentioned in the body of the work. This list is arranged systematically under Natural Orders, while a brief general index concludes an exceptionally useful little volume. We should not omit to mention the various maps, which show at a glance where the various plant crops are cultivated and a variety of other features.

Bird-Life in the Isle of Man. By Colonel H. W. MADOC, C.B.E., M.V.O. London: H. F. and G. Witherby, 1934, 199 pages, with 12 plates from photographs. Price 6s. net. This is one of the most charming little books on a local bird-fauna that we have seen. Every visitor to the land of Hall Caine, especially if he be interested in wild life, should take a copy with him, or purchase it immediately on arrival. We imagine that most people who land on the island, at least in the summer season, go there for holiday purposes, and we venture to assert that the pleasure of walking through the charming Manx scenery will be greatly intensified by the perusal of the fascinating paragraphs which he will find about every bird which he can possibly meet. It is extraordinarily interesting to learn that the author is a Chief Constable, and that the study of birds has been his chief hobby. He very modestly disclaims distinction as an ornithologist, in which point we venture to disagree with him. The text is well printed and the plates of much excellence ; the volume is worthy of a much better binding.

SOME RECENT NOTES ON BIRDS IN THE FORTH AREA.

By The Midlothian Ornithological Club.

(*Unless otherwise stated, dates refer to* 1933.)

Jay.—Two were shot at Baddingsgill, West Lothian, in April 1932, and another pair were shot on 20th April 1933 at the same place.

Goldfinch.—One in the Granton Ship-breaking Yard on 5th February. Two in Wardie Crescent, Granton, on 6th to 7th June.

Shore Lark.—One at Harperrig Reservoir on 11th December.

Yellow Wagtail.—One at Threipmuir Reservoir on 7th May.

Pied Flycatcher.—One on the Isle of May on 6th to 7th September.

Red-breasted Flycatcher.—One was obtained on the Isle of May on 8th September.

Bluethroat (probably *C. svecica gætkei*).—One immature bird on the Isle of May on 7th to 8th September.

Barn Owl, Light-breasted.—One was found dead in the Botanic Garden, Edinburgh, in December.

Short-eared Owl.—One on Coldingham Moor on 9th April. One over Aberlady Bay on 20th May. One near Craigenterrie, Pentlands, on 3rd September.

Peregrine Falcon.—One near Threipmuir on 10th September, 1st October, and 29th November.

Merlin.—A female was shot in the Botanic Garden, Edinburgh, on 28th November and was sent to the M.O.C.

Osprey.—One over Cobbinshaw and Harperrig Reservoirs on 6th May.

Yellow-billed Bean Goose (*A. a. arvensis*).—A single bird, of this sub-species, was first observed at Harperrig

Reservoir on 18th November and remained throughout the winter. Mr W. B. Alexander saw this bird on 6th January 1934 and was of the opinion that it belonged to this species. Mr John Berry confirmed this opinion on 29th March 1934.

GADWALL.—One off Granton Point on 27th July.

LONG-TAILED DUCK.—A single female on Cobbinshaw Reservoir on 3rd December 1932. A party of eight close inshore at Redheugh, Cockburnspath.

LITTLE STINT. — One at Cobbinshaw Reservoir on 23rd September and one at Harperrig Reservoir on 29th September.

RUFF.—Single birds at Threipmuir Reservoir on 24th August and 26th September, at Cobbinshaw Reservoir on 25th August, and at Harperrig on 9th September.

GREY PLOVER.—One at Threipmuir Reservoir on 26th September.

GLAUCOUS GULL.—One immature bird at Granton on 18th March.

ICELAND GULL.—Three individuals of this species were recorded at Granton during 1933. An immature bird appeared on 26th February after a north-east gale, an adult bird remained from 20th to 24th April, while another immature bird frequented the harbour from 26th April to 6th May.

LITTLE TERN.—Two to three birds at Granton on 5th September 1932.

RED-NECKED GREBE.—One in Granton harbour on 24th January 1932.

SLAVONIAN GREBE.—One in Granton harbour on 5th March.

BLACK-NECKED GREBE.—One near the Forth Bridge on 26th February.

WATER RAIL.—Single birds of this species at Bavelaw Reservoir on 30th July and 6th September. One frequented the pond in the Botanic Garden, Edinburgh, from 24th October to 7th November.

A NOTE ON THE VICE-COUNTIES OF INVERNESS-SHIRE.

By Kenneth J. Morton, F.R.E.S.

In Prof. Boycott's interesting paper (Scot. Nat., 1934, p. 1) on Mollusca at Aviemore, it is stated that "Aviemore itself is in Elgin, not Easterness." To entomologists, I suppose, the point is not of much importance. It is the outcome of a strict adherence to the letter of a good system which it might be an advantage to amend in some details, an operation that has no doubt been performed by many entomologists for themselves in their published records. It is true that most of the leading entomologists at the end of last century approved of the Watsonian scheme of Counties and Vice-Counties, at least in principle, and it forms the basis of the divisions in Prof. Balfour-Browne's "Plea for Uniformity in the Method of Recording Insect Captures" (*Ent. Mon. Mag.*, vol. lxvii., p. 186). I think, however, that he has adopted for the primary County divisions their present civil boundaries (I am referring only to Scotland) with one or two exceptions, and if this is so, no "Aviemore" anomaly will arise; it may be noted that he refers to the "Aviemore district" as in *Easterness* (Scot. Nat., 1934, p. 23). Since Watson's time the civil boundaries of some of the Counties have been revised; now they may be regarded as stabilised, and as Prof. Balfour-Browne has indicated, they are marked on most maps. They are therefore much better for practical purposes than obsolete boundaries that are now more or less difficult to define and evidently a source of confusion.

The sub-divisions of the large Counties of Perth and Inverness have always been of interest to me. For the internal boundaries of these, there are no official lines to follow and, perforce, physical features have to be used. It strikes me as rather remarkable that in sub-dividing the County of Inverness, one of its most outstanding features, the Great Glen, has been quite ignored. It is not even marked at all in the map in *Topographical Botany*. This

omission may or may not have had something to do with what seems to me to be an error on Roebuck's part, to which I will now refer.

In Prof. Boycott's article, he mentions a paper by Roebuck on *Easterness* (SCOT. NAT., 1916, p. 107), and indicates that the latter has given therein a clear exposition of this Watsonian Vice-County. If this be so, Roebuck's sketch map appears to be inconsistent with his own text and with Watson's, as far as an important part of the *Southern* boundary of the Vice-County is concerned.

The line of the main water-shed of the North-West Highlands runs, generally, north and south, but towards its southern end it branches eastward, running *South of Loch Quoich and Loch Garry*, to the summit level of the Great Glen (line of the Caledonian Canal). The summit level lies between Loch Oich and Loch Lochy—whence the drainage flows to the eastern and western seas. Continuing eastwards the water-shed forms a bend separating the waters of the Roy (tributary of the Spean) from those of the Spey, then passes north of Loch Laggan, afterwards turning southwards towards Loch Ericht. In Roebuck's map this transverse part of the water-shed, instead of crossing the Great Glen at the summit level, is carried northwards to about the middle of Loch Ness—why I have not been able to fathom. The result is that Glen Moriston and Glen Garry are shown as in *Westerness*, although the waters of both belong to the eastern drainage and the relative area accordingly falls to be included in *Easterness*. The line of the water-shed as I have described it, is shown clearly in a useful *Orographical and Bathymetrical Map of Scotland* in *Chapters on the Geology of Scotland* by the late Drs. Peach and Horne (Oxford University Press, 1930) an authority that can hardly be called in question. I should like to add that the late William Evans, a most competent botanist, and as such attached to the Watsonian scheme, in recording a Dragon-fly from Glen Moriston, placed the locality in *Easterness*. He was right and no doubt followed Watson's text but not Roebuck's map.

I am indebted to Mr W. Edgar Evans, B.Sc., of the Royal

Botanic Garden, for valuable information regarding the practice of botanists in connection with their records, and he has also given me a tracing of that part of the map in "Topographical Botany" which relates to *Easterness* and *Westerness*. This map is perplexing on account of the entire absence of informative details. Evans has indicated that as far as any opinion can be formed from such a bare document, the line of the water-shed separating eastern from western drainage would probably, in this map, cross the canal somewhere on Loch Oich. This line, although not the true line of the water-shed, is much nearer it than is shown in Roebuck's map and is therefore less obviously inconsistent with the strict terms of Watson's text. The same may be said of the very useful map issued with Druce's *Comital Flora of the British Isles*; in this the Vice-County boundary passes between Loch Oich and Loch Ness and runs westward, *North of Loch Garry*, to the County boundary. It is perfectly clear that Glen Moriston, placed by Roebuck in *Westerness*, must be given to *Easterness*, and I have failed to find any reason why Glen Garry should not also be included in the latter Vice-County.

Of the two Vice-Counties, *Easterness* and *Westerness*, comprising the whole County of Inverness within the present civil boundaries, Easterness in particular (with or without the addition of Nairn) is far too large to be of much use as an indication of where a species has been found. The area includes localities separated by distances of 50 or 60 miles; and not only so, but each of its two parts lies in a different one of the four major divisions of Scotland—one being in the "North-West Highlands or Northern Block," the other in the "Grampian Highlands or Central Block" (terms used by Peach and Horne). Some further sub-division might be an advantage.

In another place I have already ventured to use the term *North Inverness* to designate that part of *Easterness* which is cut off by the canal (*North-West* would perhaps have been better in order to show that its position is entirely in the "North-West Highlands"); a distinctive feature of this part is the series of fine Glens—Glen Garry, Glen Moriston,

Glen Urquhart, Strathglass, Glen Affric, Glen Cannich and Glen Strathfarrar. *Easterness* would thus be restricted to the east side of the canal. I have also applied the name of *South-West Inverness* to that part of *Westerness* which is cut off by the Canal and Upper Loch Linnhe: this part includes the Ben Nevis range, Loch Laggan, Loch Treig and the River Spean, and it belongs to the "Grampian Highlands," *Westerness*, as restricted, being in the "North-West Highlands." The sub-division *South-West Inverness* was originally suggested by my late friend William Evans in some MS. notes that have come into my hands.

In this proposed division of the County into four, the Great Glen has been given chief prominence as a boundary, with its summit level as a centre where the four divisions meet and from which runs—east and west—the water-shed whose position has, in my view, been misunderstood, giving occasion for this Note.

Risso's Dolphin stranded in Orkney.—Two recent records of the stranding of this species (*Grampus griseus*) have come from Orkney. Towards the end of November 1933 a female, one of a school of six, got stranded in Deersound; it measured 10 feet $9\frac{1}{2}$ inches in length.

In the middle of February 1934 two more specimens were stranded in the Bay of Firth about $4\frac{1}{2}$ miles from Kirkwall. Both were identical in size and appearance and measured 9 feet 10 inches in length.—A. C. Stephen, Edinburgh.

Cuvier's Whale stranded in Argyll.—On the 30th January 1934 an example of Cuvier's Whale (*Ziphius cavirostris*), 24 feet 9 inches in length, was stranded at Kilchoman, Islay. Parts of the specimen were forwarded to the British Museum, and I have to thank Mr J. C. Fraser for the identification.—A. C. Stephen, Edinburgh.

COUNTY BOUNDARIES.

By Professor FRANK BALFOUR-BROWNE.

IN the January number of this *Journal*, Professor Boycott refers to Aviemore as being in the County of Elgin and quotes the late Denison Roebuck as his authority. In April 1917, Roebuck published a paper in this *Journal* in which he explained that before 1870 a part of Inverness County was in the County of Elgin, while an area north-east of this was an isolated part of Inverness. In 1870, an exchange was made whereby the isolated region of Inverness became part of Elgin and the area to the south-west of this was transferred to Inverness.

By our rules as to unattached areas of Counties, the originally isolated part of Inverness had been treated as part of Elgin, so that the only change which mattered, so far as records are concerned, was the transference of the south-west corner of Elgin to Inverness.

The County divisions were originally selected by Watson because, in the first place, they were already in use by most naturalists, and further, anyone could find them on almost any map. The Vice-County divisions are for those specially interested in distribution problems and are beyond the ken of the majority of collectors. The average collector still records on the County system, and he gets his information from the maps obtainable at the present day.

Therefore, it seems to me essential that we accept the change made in 1870 and rely upon present-day maps for our County boundaries. After all, there is no need for hyperconscientious conservatism since we have, most of us, accepted Praeger's emendations of the original Vice-County divisions of Ireland, which were comparatively recent and which have probably produced much more confusion with regard to earlier records than this County boundary change.

BOOK NOTICES

The Atlantean Continent: Its Bearing upon the Great Ice Age and the Distribution of Species. By H. EDWARD FORREST, F.L.S. London: H. F. and G. Witherby, 1933, 328 pages, with plates, text figures and maps. Price 10s. 6d. net. Using the author's own words, in this volume he "adduces evidence to show that in Miocene times the North Atlantic Ocean did not exist" and that "in its place there was continuous land—an Atlantean Continent—uniting Europe with North America." By raising the bed of the Atlantic some 12,000 feet a continent arises in its place, with a mountain range which in Iceland culminates in an altitude of 17,000 feet. This range he calls the Atlantean Alps, and these northern heights would give rise to a gigantic snow-field, to which he attributes the origin of the great ice sheet which covered a large part of Europe and North America. He also uses this theory to account for the present distribution of plant and animal species. Over 30 per cent. of the text consists of verbatim quotations which the author has been at great pains to select and marshal in the order best suited to support his theory and its corollaries. Whether these will be accepted by the general body of geologists seems doubtful, but time will show. The limits of our space do not permit us to discuss the subject, so that we can only draw our readers' attention to this ingeniously compiled volume, which is boldly written and well printed.

Pentland Days and Country Ways: a Walker's Wallet. By WILL GRANT. London, etc.: Thomas Nelson & Sons, Ltd., No date, 189 pages, coloured frontispiece and 30 photographic illustrations. Price 3s. 6d. net. Although most of the chapters in this well-written little book have appeared elsewhere they are well worth re-publishing in book form. The volume as it now stands, with its excellent illustrations, will form a delightful companion for the many pedestrians who have traversed (and will again traverse) the numerous roads and paths which cross the Pentland Hills in all directions. There is a wonderful fund of legend, history and romance connected with these favourite uplands, and in the very moderate compass of this book the author has succeeded in gathering together a most interesting series of reminiscences and stories, together with a good deal of more serious information on the origin of various place-names, historical associations, the influence of the hills on many Pentland poets and writers, not the least of these being R. L. Stevenson, and so on. We have only one suggestion to make—the addition of a sketch-map indicating the position of the various places mentioned in the text would greatly increase the value of the book.

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PUBLISHERS' NOTE.

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(*Authors are responsible for nomenclature used.*)

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FULMAR PETREL INVESTIGATION (1934).

We would like to draw our readers' attention to the above investigation which is being conducted this year under the auspices of the British Trust for Ornithology. Prior to the year 1878, the only known breeding station of this bird in the British Isles was in the St Kilda group, but since that date the Fulmar has extended its breeding range in a most remarkable manner, and it is with a view to ascertaining its present status as a breeding species in the British Isles that this scheme is being undertaken.

Mr Waterston, who is conducting the inquiry, informs us that information is particularly desired from many of the islands off the west coast of Scotland. It is most important that observers take great care to ascertain whether the Fulmars have eggs or young before recording the species as definitely breeding at any locality, as it is often a habit of this bird to frequent a site for a number of years before breeding actually takes place. Negative information, *i.e.* notes on localities where as yet there are no Fulmars, would be of great value.

Schedules can be obtained from Mr George Waterston, 27 Inverleith Terrace, Edinburgh, giving full details of the Investigation, and all correspondence on the subject should be addressed to him.

BOOK NOTICES

Nonsuch: Land of Water. By WILLIAM BEEBE, Sc.D., LL.D., Director of the Department of Tropical Research of the New York Zoological Society. London and New York: Putnams, 1934, 8vo, 245 pages, with 55 illustrations. Price 7s. 6d. net. Few of our readers will be able to interpret the title of this remarkable book, so that it is necessary to inform them that Nonsuch is an island of the Bermuda group, and that the book is filled with studies by the author of the life in the water immediately surrounding it. The book was first published in England in 1932, and the publishers must be congratulated on their enterprise in re-issuing it in its present remarkably cheap and yet most attractive form. Dr Beebe writes in a picturesque style, one peculiarly his own. Most of the adventures and discoveries related in this volume were made actually under water, and the story is so fascinating that after commencing its perusal, it is difficult to lay the book down until the very last page is reached. We learn that other volumes by this talented writer and investigator are in course of preparation, to be added to the many which already stand to his credit.

At Whipsnade Zoo: with a Wallaby Guide. By GLADYS DAVIDSON, F.Z.S. Illustrated by L. R. Brightwell, F.Z.S. London, etc.: Thomas Nelson & Sons Ltd., no date, 8vo, 156 pages and 33 illustrations. Price 2s. 6d. net. This is one of a new series of books for young people under the general title of "Discovery Books." Fritz and Freda, the two human characters of this book, are supposed to be conducted through the various by-ways of the Whipsnade Zoo by a very friendly wallaby, who introduces the various tenants of the enclosures as they are encountered, and they all enter into imaginary conversations which will interest and amuse the youthful reader. On the front end-paper is printed a clear and easily understood plan of the Zoo, with figures printed thereon which refer to the pages in the book. The child can hardly use this little book as a guide to be carried in the hand, but before and after a visit to Whipsnade its perusal will give him a good deal of pleasure.

On the Sea-shore. By L. R. BRIGHTWELL, F.Z.S. Illustrated by the Author. London, etc.: Thomas Nelson & Sons Ltd., 8vo, 119 pages, 48 illustrations and coloured frontispiece. Price 2s. 6d. net. One of the new series of "Discovery Books," this well-written and nicely-illustrated little volume can be recommended as an excellent gift-book for a boy or girl on the eve of the summer holidays. In its eleven chapters one finds just sufficient information, given in simple language, as is needed to render a visit to the coast of vastly greater interest than it has ever been before. Within the moderate compass of about a hundred pages a surprising amount of detail is offered to the reader concerning the lives and habits of all sorts of creatures living on the shore, from well above high-water mark down to the sea itself. The style is easy and readable, and the many illustrations well-chosen and instructive.

THE GREAT SKUA.

By H. J. Burkill, M.A., F.R.G.S.

In the September-October issue of the Scottish Naturalist, Mr R. Stuart Bruce published some interesting notes on the birds he had seen in the Shetlands, and he stated that legal protection had been withdrawn from the Great Skua (*Stercorarius skua* Brunn.) on account of complaints from the crofters that this species had killed sheep and lambs, a complaint which the author said he did not believe to be justified.

It would therefore be interesting to know exactly what the evidence was on which this legal decision was based. The crofters, being resident in the district, would be better able to observe what does happen, and though as sheep owners they may be prejudiced, is it likely that suppositions unsupported by facts would be allowed to influence the authorities in deciding no longer to protect the Great Skua?

This bird, known to be aggressive and to threaten human beings as well as animals that come too near its nest, seems to have more than its share of that extra courage shown by birds when danger apparently threatens the young.

On reading the article referred to, I turned to a book published last year, *Birds of the Falkland Islands*, by A. F. Cobb, B.A., F.R.G.S., in which the author, who was many years in those islands, gives interesting accounts of various species that have come under his observation. One of these is the Port Egmont Hen, or Falkland Island Skua (*Stercorarius skua antarctica*), a species so closely related to the British one that Yarrell considered the two to be identical.

Mr Cobb states: "Lambs, sheep when helpless on their backs, goslings, ducklings and any such defenceless creatures are unmercifully attacked by them. They will even eat one another." He then goes on to describe their attacks on men, dogs and horses.

After reading this, I wrote to Mr Cobb and asked if he

could supply further particulars, which he very kindly did. In his letter he says—

"They kill the sheep by pecking out their eyes, eating the tongue and soft parts, kidneys, etc., and gradually pecking big holes in the stomach, eat the entrails, and, if you give them time, they will pick the whole carcase clean of meat. It is for this that the shepherds have to go round their grounds every day in the spring and early summer, lifting up sheep and skinning the dead, and saving the skins from being pecked to bits and spoiled in shape. One Skua can kill a sheep in this way, or one gull, but there is often a crowd of birds at a sheep, and that is how one sees a casualty at a distance sometimes, for a crowd of white gulls can be seen a long way off. I have been hit on the head a few times by a Skua's wing."

This is the evidence of an educated man who took his B.A. degree at, I believe, Oxford, and then went out sheep-farming in the Falklands, and it is the evidence of a man interested in birds, as can be seen from his book, and as the result of many years among the Skuas he does not regard them as the farmer's friends. His remark as to the birds pecking at the kidneys reminds one of the Kea, and shows that there must be some scent given off through the skin that enables the birds to locate these organs, and thus to eat down to them.

Other authors speak of the British species attacking men, and there is an instance of a pair driving off an Eagle from their nesting site. (*Ornithologist's Guide to Orkney and Shetland*, Dunn.) The attacks on men may at times be magnified by the victims from the terrifying appearance of the bird swooping at full speed towards the head, and the bird be accused of more than it is capable of carrying out, but Mr Cobb's account of it in the Falkland Islands and the crofters' charges here look as if the bird cannot be altogether innocent.

It would, as I said above, be interesting to have the detailed evidence from the Shetlands set out, so that the man in the street may come to a more satisfactory opinion on the problem.

[The statement that legal protection has been withdrawn from the Great Skua is somewhat inaccurate, for the Order by the Secretary of State for Scotland, dated 14th March 1933, makes the important exception "of Hermaness in the parish of Unst, namely the area to the north of a line drawn from the Neap on the west to Fiskawick on the east," and there the Great Skua is still protected. Should the partial removal of protection result in any serious diminution of Great Skuas, though we may be assured that the advisers of the Secretary of State were of opinion that this was not likely to happen, we should be glad to receive evidence of such diminution and its causes in order to forward it to the proper quarter.—EDS.]

NOTE

First Nesting of Leach's Fork-tailed Petrel in Orkney. —The only known nesting-places of Leach's Fork-tailed Petrel (*Oceanodroma leucorrhoa leucorrhoa*) in Great Britain and Ireland are the St Kilda Group, the Flannan Islands and North Rona in Scotland, and a few small islets off Cos. Kerry and Mayo in Ireland. The head lightkeeper on Sule Skerry, Orkney, informs me that a pair nested there during the summer of 1933. The birds did not nest among the large numbers of Storm Petrels, but were quite alone, and Mr Colin M'Cormick, after seeing the birds several times in June, was fortunate to find the bird sitting upon its egg. He did not disturb it again, but some weeks afterwards found the egg-shell, proving that the chick got away. As I mentioned in the SCOTTISH NATURALIST (1930, p. 22), a pair in my collection were killed against this lighthouse on the night of 21st September 1908, when others of this species were flying round the light. A third, killed at the same time, is in the late F. W. Smalley's collection, now in the Royal Scottish Museum, Edinburgh.—H. W. ROBINSON, Lancaster.

THE HARE IN NORTH UIST.

By GEORGE BEVERIDGE.

THE Hare is not indigenous to the Outer Islands, and both the Blue or Mountain Hare and the Brown Hare were introduced to North Uist by Sir Arthur Campbell Orde, Bart., of Kilmory and North Uist, in 1890 to 1893.

They were put down originally as follows: the Brown Hare at Newton and the White Hare at Langass.

For the first few years little was seen of them, but during the last ten years they have spread practically all over North Uist. Eight years ago, a Brown Hare was caught in a rabbit trap on the Island of Vallay. As there is little cover in winter in the Islands, the Hare takes advantage of rabbit holes or cairns, or any other shelter that may be handy. I have noticed this on several occasions.

The Hare which came to Vallay, which is a tidal island, would even at low tide have to negotiate some water, though at low tide during the Springs he might only get his feet wet.

I have shot several Hares during the winter months which were for the most part white, but had a good deal of brown colouring about them. Can it be that the Blue Hare crosses with the White Hare?* Of the Hares I have examined in Uist, the Brown has been in the better condition without exception.

Here, both the Brown and the Blue Hare keep to the hill ground, no doubt on account of the cover it affords, but at times, as in the case of the Hare which was trapped in a rabbit hole, they make their way to the "machair"—the low ground where bent grass is found, and which is such a favoured place for rabbits.

* [Examples of hybrids between the Brown and Mountain Hare have been recorded, characteristic features and skull characters being intermediate between those of the two species.—EDS.]

THE STATUS OF PETRELS IN CERTAIN REMOTE SCOTTISH ISLANDS.

By Malcolm Stewart, B.A., F.G.S.

At this time, when one learns that there is an inquiry being made into the status of the Fulmar, it is possibly of interest to record the status of Petrels in certain remote Scottish islands. The islands dealt with in the present paper are North Rona and Sula Sgeir, situated equidistant from Cape Wrath and the Butt of the Lewis, being some forty-five miles north-west of the former and a like distance north-east of the latter; and the Flannan Islands, twenty miles west of Gallan Head in the Lewis.

All these islands are little known, as, being situated far from the coast of adjacent land, they are subjected to the full force of the North Atlantic swell, and are almost inaccessible. Both North Rona and Sula Sgeir are uninhabited, though there was a permanent population on the former till 1844. The island of Sula Sgeir is, of course, one of the largest gannetries in this country. On Eilean Mor off the Flannan Islands the Commissioners of Northern Lighthouses erected a lighthouse at the close of last century. The physical features, the history and the fauna of these islands have already been described elsewhere (9)*, and it is not proposed, therefore, to repeat such details here. Suffice it to know, however, that these islands have been little visited since the War, for the days seem to have passed when naturalists could afford to tour the northern and western coasts of Scotland in private yachts.

Though not an ornithologist, the present writer has taken a considerable interest in these islands, and in the course of his work has visited them all. The following notes, therefore, are based on past references, which he believes to be more or less complete, together with his own observations.

* Figures in parentheses denote list of references at end of paper.

NORTH RONA.

1883. Fulmars not recorded by John Swinburne. Leach's Petrel very common, but no trace of the Stormy.(10)

1885. Fulmars not seen by Harvie-Brown, but both Leach's Petrels and Stormy Petrels recorded.(6)

1886. R. M. Barrington "saw one Fulmar at North Rona." (6, 7)

1887. Harvie-Brown saw numerous Fulmars, but it is doubtful if they were nesting.(7, 8)

(1907. Though the Duchess of Bedford visited North Rona in this year, there is no account of Petrels given.)

1910. Duchess of Bedford records Fulmars breeding in very large numbers. She saw Stormy Petrels but did not find Leach's.(1)

1914. Duchess of Bedford saw "hundreds of Fulmars on the island." (2)

1931. Mr T. H. Harrisson's estimate of 600 pairs of Fulmars, 120 Leach's, and 80 Stormy.(5, 9)

SULA SGEIR.

1883. John Swinburne does not record either the Fulmar, Leach's or Stormy Petrel.(10)

1887. Harvie-Brown saw Fulmars "abundantly *resting* on and flying round Sula Sgeir." (8)

1932. The present writer estimates the number of Fulmars on Sula Sgeir not to exceed 150 pairs. He also thinks that there is a strong probability that Leach's Petrel nests in the ruined buildings on this island.(9)

THE FLANNAN ISLANDS.

1881. Harvie-Brown saw several Fulmars.(7)

1902. Herbert Langton obtained two eggs of Fulmars.(7)

1904. Eagle Clarke notes that two pairs of Fulmars nested on Eilean Mor for the first time, though they had bred on the outer islands of the group for several years. He reports that Stormy Petrels are abundant breeding on Eilean Mor, and probably also on the other islands. He describes the Flannan Islands as one of the chief breeding centres in the British Isles of Leach's Petrel.(3, 4, 7)

1932. The present writer saw no Fulmars nesting on these islands, though plenty were observed in flight. He was informed by one of the lighthouse keepers that they nested only on the more

inaccessible cliffs, and their numbers were not large. The same informant estimated the Leach's Petrels at some 40 pairs, confined chiefly to the area of high ground near the flag staff. Stormy Petrels though known were not so common as the Leach's.(9)

There are so many papers already written describing these Petrels that one who is not an ornithologist does not presume to add to them. It is, however, interesting to note that the Fulmars, when they are not interfered with by man, will nest quite openly in the grass or among rocks on the tops of the islands, and do not confine themselves to the cliffs. The writer observed this to be the case in North Rona and Sula Sgeir which are uninhabited. In these islands the Fulmars nested for the most part among the ruined buildings. The Duchess of Bedford also observed this on North Rona.

In the St Kilda group only the main island, Hirta, was inhabited, and here the Fulmars are, for the most part, confined to the cliffs. On the other islands, however, which were not inhabited, there is more of a tendency for these birds to nest in the open. It will be interesting to see in a few years' time whether the Fulmars on Hirta will nest openly on the island now that it is evacuated, or rather free from the pursuit of man during most of the year.

With reference to the Flannan Islands, the writer did not observe any Fulmars nesting, so that the above remarks cannot be applied here. With the exception of Puffins, there did not seem to be half such a density of birds on these islands as compared with North Rona.

Neither Leach's Petrels nor Stormy Petrels have been definitely established as breeding on Sula Sgeir. This is hardly surprising, as owing to the extreme inaccessibility of this island there must be few indeed who have succeeded in landing on this rock, other than the fishermen who proceed there annually in September from Ness in the Lewis to take the young Gannets. One disturbing night on this island, however, reminded the writer of nights spent among the Leach's Petrels on North Rona. The nocturnal flight and behaviour of the birds in question were identical with those of Leach's Petrels observed on the latter island, and the

writer feels certain that conclusive evidence will eventually come forth that Sula Sgeir is a breeding place of Leach's Petrel in addition to North Rona and the Flannan Islands.

REFERENCES.

[1] BEDFORD, Duchess of, "On Visits paid to the Island of N. Rona," *Annals of Scottish Natural History*, 1910, pp. 212-14.

[2] BEDFORD, Duchess of, "Spring Bird Notes from Various Scottish Islands," *Scottish Naturalist*, 1914, pp. 173-81.

[3] CLARKE, W. EAGLE, "The Birds of the Flannan Islands, Outer Hebrides," *Annals of Scottish Natural History*, 1905, pp. 8-19 and 80-86.

[4] CLARKE, W. EAGLE, *Studies in Bird Migration.* 8vo, London, 1912, vol. ii., pp. 250-85.

[5] HARRISSON, T. H., "Resident and Migratory Birds of North Rona, the Remotest Scottish Island," *The Ibis*, 1932, pp. 441-57.

[6] HARVIE-BROWN, J. A., "Further Notes on North Rona, being an Appendix to Mr John Swinburne's Paper on that Island in the 'Proceedings' of this Society, 1883-84," *Proceedings of the Royal Physical Society of Edinburgh*, 1885-86, pp. 284-98.

[7] HARVIE-BROWN, J. A., "The Fulmar: Its Past and Present Distribution as a Breeding Species in the British Isles," *Scottish Naturalist*, 1912, pp. 97-102 and 121-32.

[8] HARVIE-BROWN, J. A., and BUCKLEY, T. E., *A Vertebrate Fauna of the Outer Hebrides.* 8vo, Edin., 1888.

[9] STEWART, MALCOLM, *Ronay: A Description of the Islands of North Rona and Sula Sgeir, etc., to which is appended a Short Account of the Seven Hunters or Flannan Islands.* 8vo, London, 1933.

[10] SWINBURNE, JOHN, "Notes on the Islands of Sula Sgeir or North Barra and North Rona, with a List of Birds Inhabiting Them," *Proceedings of the Royal Physical Society of Edinburgh*, 1883-84, pp. 51-67.

Toads and Toad Life. By JEAN ROSTAND. Translated from the French by Joan Fletcher. London: Methuen & Co., Ltd., 1934, 8vo, 192 pages and 11 photographic illustrations. Price 7s. 6d. net. Many people have an aversion to the Toad, some believe it to be venomous, and a few even regard as true the myths which still linger on and which credit this harmless amphibian with the possession of dangerous properties on the one hand or beneficial influences on the other. A careful perusal of this carefully translated account of its natural history will soon put this much maligned creature in its proper place in the mind of the reader. He will certainly be surprised at the amount of interest which surrounds the life of one of the commonest of the earth's crawlers. Although it is not possible to ascribe the epithet "beautiful" to the common Toad, yet there is a considerable amount of fascination attached to the study of its various activities. The whole life-history of the animal, presenting a multitude of interesting problems, is fully described in this little volume, which should appeal to the general public and the university student alike.

THE WATER SHREW (*NEOMYS FODIENS*) ON PLADDA ISLAND.

By the Rev. J. M. McWilliam, B.A.

In 1925, Mr John M'Lean, lighthouse-keeper on Pladda, told me about the existence of a small mammal on Pladda. In May of that year he procured for me three specimens, which I sent to Mr Martin A. C. Hinton of the British Museum, where they are still preserved. Mr Hinton informed me that these were Water Shrews. I did not report them at that time, as I was specially engaged in other work. He wrote to me recently in connection with these specimens—"The Water Shrew is a rather variable animal, and we possess too little material to do much with it at present. The Pladda specimens, like one from Arran and one from Dartmoor in the collection, are rather smaller than are specimens from Eastern England. It may be that there is a distinct small western sub-species, but much more material from both sides of the country will be necessary before any attempt to separate them can be made." These Water Shrews were apparently fairly numerous on Pladda at that time. I had, then and since, several conversations about them with the light-keepers. They lived amongst the long grass and stones near the little pier, and Mr M'Lean had a terrier which pounced on them and caught them. One of the light-keepers had a curious story, which I transmit as it was given to me, that these animals appeared to be blind. About two or three years ago I asked a friend, who is at present light-keeper on Pladda, to get me some more specimens. A careful search was made for them, and none could be found. Mr M'Lean, who lives now on Arran, paid one or more visits to Pladda, with the original terrier, to see what he could do, but no trace of them can now be found. The explanation given to me is that one of the light-keepers imported a cat to the island, which is believed to have exterminated the Shrews.

This is in several respects a curious story. The Water

Shrew has long been known to inhabit Arran. Pladda is a rocky island about half a mile in length, and separated by about that distance from Arran. It is a typical small Clyde island, and is apparently entirely unsuitable for such a creature as the Water Shrew. Drinking water has to be imported to Pladda. Except for the facts here recorded, so far as I am aware, nothing whatever is known about the history of these Pladda Shrews. It is conceivable that they may have been introduced in some way, but it seems at least possible that they may always have been there. They form a curious example of the liability to extinction of such creatures when dwelling on small islands. If it had not been for the activities of Mr M'Lean's terrier we should never have known of their existence on Pladda before they were finally destroyed by the lighthouse cat. A careful look-out is still being kept for possible survivors, and it may be that a few still remain to perpetuate the species. It would be an unfortunate thing if the presumably long history of the Pladda Water Shrews is ended so soon after their discovery, but at least we are fortunate to possess these three specimens, and these few facts about their history.

Man's Place among the Anthropoids. Three Lectures on the Evolution of Man from the Lower Vertebrates. By WILLIAM KING GREGORY, Ph.D., F.G.S., F.Z.S. Oxford: Clarendon Press, 1934, 8vo, 119 pages and 11 figures. Price 6s. net. The student of the important subject with which this volume deals must be greatly indebted to the author for issuing in permanent and readable form the substance of his three lectures, which were given in London and Oxford last year, and which obviously could only have been listened to by a very small proportion of those interested. Dr Gregory's lectures are in essence a defence of the old Darwinian contention that the immediate ancestors of man should be found among the anthropoid apes, as against the arguments of Professor Wood Jones, which are in favour of placing the derivation of the human race much further back in the vertebrate history, with the curious "Spectral Tarsier" of Borneo and the Philippines as a distant relative. The first lecture deals with the locomotor skeleton, the second with the jaws and teeth, and the third with the face and brain-case. This extremely interesting volume is adorned with extremely effective illustrations.

THE RATE OF GROWTH OF *BALANUS*.*

By HILARY B. MOORE, Ph.D., Biological Station, Port Erin, I.O.M.

MATERIAL.

IN April 1933 some of the wooden piles of Keppel Pier at Millport were being drawn for replacement, and Mr R. Elmhirst collected a number of animals which were growing on them. He gave me a series of *B. balanus*, growing at a depth of 4 to 14 feet below low-water level, several of which showed what appeared to be annual rings on the calcareous base. Only six of them showed these rings sufficiently clearly to allow of their being measured without confusion, but in addition there were a sufficient number of smaller specimens, not showing rings, but falling into obvious year groups according to their size, to allow the size at $\frac{1}{2}$, $1\frac{1}{2}$, and $2\frac{1}{2}$ years to be determined by an independent method.

A photograph, with a scale included, was taken of a part of one of the piles where there was a heavy settlement of this year's spat, and from this the lengths of thirty specimens were measured. Owing to their small size, the specific identity of these small individuals is not certain, but they possess a calcified basis, and agree as far as can be seen with *B. balanus;* and further they occur in numbers among the larger individuals of that species, no other species occurring at the same level, although there was a good growth of *B. crenatus* higher up the piles, and of *B. balanoides* above that. The identification is therefore probably correct, and in any case the spat of either *B. balanus* or *B. crenatus* could not have reached a very different size at that age. The individuals of two or more years old could be accurately identified (Krüger, 1927; Darwin, 1854).

* *Balanus balanus* (Linn.) Da Costa. Darwin, 1854, as *B. porcatus* Da Costa.

Appearance of Rings: and Methods.

The above specimens were all growing on wood, from which they could be detached without serious damage to their bases. In addition three specimens were trawled off Port Erin, Isle of Man, in 17 fathoms, growing on a broken bottle, and with beautifully smooth bases. They were removed from the bottle after prolonged boiling in caustic soda.

The winter rings appeared in the Millport specimens as chalky white concentric lines standing out by contrast against the more translucent white of the rest of the base, and usually in a series of about four lines per winter ring. The lines were about 0·1 mm. wide and about 0·2 mm. apart, but these measurements were very variable. In some cases the lines had become fused in the winter ring into a single discontinuous band. Growth rings of about the same size and spacing were visible between the winter rings also, but with a less chalky consistency, and showing chiefly where the base had become stained by the wood to which it was attached. As Darwin (p. 57) has suggested, these lines probably correspond with the regions of growth at each moult. In the Port Erin specimens, which had very much smoother basal surfaces, the same type of growth rings could be detected (in the dried specimen most readily) with similar size and spacing, but here they appeared as darker bands between whiter areas. The winter rings in these specimens appeared as slightly darker areas, bounded on the outside by lighter regions where the white radial rays are broader than usual. Although these structures are clearly visible in the actual specimens when the light is incident at a suitable angle, it is difficult to reproduce satisfactorily the fine differences of texture by which the rings are apparent.

Size Distribution in the Population Sample.

The figures obtained from the size groups from Millport show the newly settled spat of that year with a mean length in April of 1·7 mm., and a range of 1·3 to 2·4 mm. As these were measured from a photograph it is not

possible to obtain any data as to the relation of volume to length at this size. The second year group, of which six specimens were available, had a mean length of 7·3 mm., with a range of from 5 to 10 mm.; and the third year group had a mean length of 2·35 cm., from six specimens ranging from 2·2 to 2·7 cm. The latter two year groups were measured from the actual specimens. These groups do not overlap.

Spacing of Winter Rings.

Turning now to the distribution of the winter rings on the bases of the Millport specimens, we find that in all six individuals there is a distinct ring with a length of 2 to 2·5 cm., and a smaller one within this, whose margin is not clearly demarcated, so that it could be measured in only three cases, and a length of 0·9 to 1·65 cm. All lengths are measured along the long axis of the barnacle on the line through the rostrum and carina.

Within this again is a small ring which shows clearly in No. 5 and also in one of the small specimens which had too rough a base to show any further rings (No. 7). It can be seen clearly in one of the Port Erin specimens also. Its length is 0·30 and 0·45 cm. in the two Millport specimens, and 0·2 cm. in that from Port Erin. In all the other specimens the central area of the basis has broken away when the shell was detached, but the break tends to occur at a place corresponding with the edge of a winter ring of about that size. Specimen No. 1 from Port Erin actually broke along the first winter ring in drying.

Correlation of Winter and April Measurements.

Before attempting to correlate the sizes obtained from the winter rings with those from the population samples taken in April, it is necessary to consider the season during which maximum growth takes place. There is no available evidence for this particular species, but it has been shown (unpublished data) at Port Erin, that the maximum growth period for *B. balanoides* is the summer, with a latent period

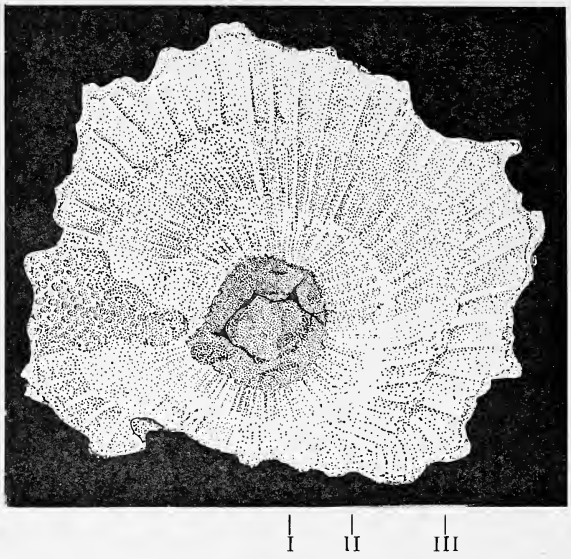

FIG. 1.—*Balanus balanus* from Port Erin. Base showing three winter rings. × 8·5.

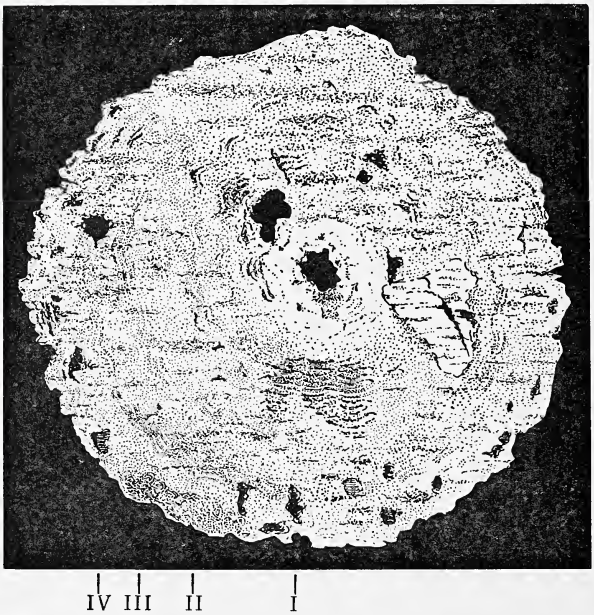

FIG. 2.—*Balanus balanus* from Millport. Base showing at least four winter rings. × 4·5.

during the winter. Similar conditions of growth hold also for other species. It is therefore probable that the main growth of *B. balanus* takes place some time during the summer, and that while the sizes found in the April sample lie between these for successive winters, they will be closer to those for the beginning of the year in question.

Considering the data for Millport first, we have material for two times of year, namely April and some time during the winter. Now the April data give us lengths of 0·17, 0·73 and 2·35 cm. for the first three years. These groups are clearly demarcated, and admit of little doubt. We have also groups of winter rings at 0·30 to 0·45, 0·9 to 1·6, and 2·0 to 2·5 cm., the first two groups from small numbers of specimens, but the last from all. The only way in which these can be fitted to the April data is that shown in Table I, and the agreement is good, with the exception of the last winter ring, where there has apparently been very little growth between April of the third year and the succeeding winter.

TABLE I.

Lengths in cm.

	MILLPORT.		PORT ERIN.	
	Winter.	April.	Winter.	March.
	...	0·17	...	...
1 winter ring . . .	0·30-0·45	0·73	0·2	...
2 winter rings . . .	0·9-1·6	2·35	0·9	...
3 winter rings . . .	2·0-2·5	...	1·5-1·8	2·2-2·4

In the Port Erin specimens there are three sizes of winter rings present, as well as the outside lengths of three specimens taken in March. Though incomplete in themselves, the figures may be compared with those from Millport as shown in Table I, since there is little doubt as to the relative correspondence of the several rings. From this comparison it would appear that growth is slower at Port Erin than at Millport.

Returning to the Millport specimens, it seems allowable to take the 2·0-2·5 cm. ring of all specimens to be that

formed in third winter, and as this is clear in all specimens, we can date all outer rings from it. Specimen No. 4 shows measurable rings right to the edge, and appears to have

Table II.

Lengths of Balanus balanus *from Millport at each visible winter ring, and the external volumes corresponding to these values as read from Fig.* 4. *Lengths in cm.; volumes in cc.*

Specimen Number.	1st Ring.	2nd Ring.	3rd Ring.	4th Ring.	5th Ring.	6th Ring.	7th Ring.	8th Ring.	9th Ring.	Size when collected.
1	...	1·25	2·45	3·6	4·3	4·6	...	...	...	5·1
2	...	...	2·4	3·3	3·8	4·2	...	...	...	4·4
3	...	...	2.3	3·40	3·76	4·24	4·46	...	...	5·0
4	...	...	2.0	2·72	2·98	3·18	3·40	3·88	4·06	4·1
5	0·30	0·90	2·35	2·90	3·30	3·48	3·78	...	...	...
6	...	1·65	2·35	2·89	3·09	3·61	...	...	...	4.0
7	0·45	...	...	...	...	...	...	...	...	...
	Volumes corresponding with the above Values.									
1	...	0·23	2·10	5·8	8·6	9·7	...	...	...	11·3
2	...	...	1·95	4·8	6·7	8·2	...	...	...	9·1
3	...	...	1·30	5·1	6·5	8·4	9·3	...	...	11·0
4	...	...	1·15	2·9	3·7	4·3	5·1	6·9	7·7	7·9
5	0·004	0·11	1·90	3·4	4·8	5·4	6·6	...	...	...
6	...	0·67	1·90	3·4	4·1	5·9	...	...	...	7·1
7	0·014	...	...	...	...	...	...	...	...	...
Average	.	.	1·72	4·63	5·73	6.98	...	...	...	...

Table III.

Balanus balanus *from Millport, June* 1933. *Average sizes as determined from population samples. Lengths in cm.; volumes in cc.*

	1st Year.	2nd Year.	3rd Year.
Number of specimens . . .	30	6	6
Av. length	0·175*	0·73	2·35
Av. vol.	0·0007	0·042	1·95

* Lengths only were measured for this size. The rest were determined from measurements of length, breadth and height.

passed its ninth winter when collected, but in the others the rings could not be separated right to the edge. Apart from the decrease in linear increment normally associated with steadily increasing volume, there is a good deal of difference

between the spacing of the several rings, and this may perhaps be associated with good and bad years. In addition, some specimens have grown faster than others throughout their lives, extreme instances being Nos. 4 and 1 which have attained lengths of 4·3 and 9·7 cm. respectively in their sixth winter.

Increase in Volume throughout Life.

It was convenient to estimate size in terms of external volume, this being calculated as the volume of a cone having the same height as the shell, and a basal diameter equal to

Table IV.

Relation of length to volume (determined from length, breadth and height) for a series of specimens of Balanus balanus *from Millport.*

Length cm.	Volume cc.	Length cm.	Volume cc.
5·1	13·3	4·0	9·0
5·0	10·4	2·7	2·98
4·7	10·2	2·4	1·66
4·6	8·6	2·3	1·45
4·6	8·8	2·3	1·47
4·5	8·8	2·2	1·34
4·4	10·2	2·2	2·00
4·4	11·0	0·81	0·061
4·2	11·0	0·79	0·051
4·2	7·5	0·55	0·017
4·2	6·5	0·52	0·015
4·1	6·3		

the mean of the basal length and breadth. Lengths were converted into volumes by the curve shown in Fig. 3, which is drawn, as an approximation only, through the twenty-three available points (Table IV). One point of interest arises from this curve, namely that this species does not, on the average, retain the same shape throughout life, but tends to become flatter with increasing age.

Fig. 3 has been drawn from the available data for each individual from Millport and Port Erin. The general growth is fairly consistent in each individual, suggesting that the differences are likely to be due to some factor such as favourableness of situation, which will operate throughout

TABLE V.

Sizes of Balanus balanus *from one mile off Port Erin, March* 1930, *and the volumes corresponding to these. Lengths in cm.; volumes in cc.*

Specimen Number.	1st Ring.	2nd Ring.	3rd Ring.	Size when Collected.
1	0·20	0·9	1·7	2·4
2	...	...	ca. 1·5	2·3
3	...	...	1·8	2·2

VOLUMES CORRESPONDING TO THE ABOVE VALUES.

1	0·03	0·10	0·70	2·0
2	...	...	ca. 0·55	1·8
3	...	...	0·85	1·6

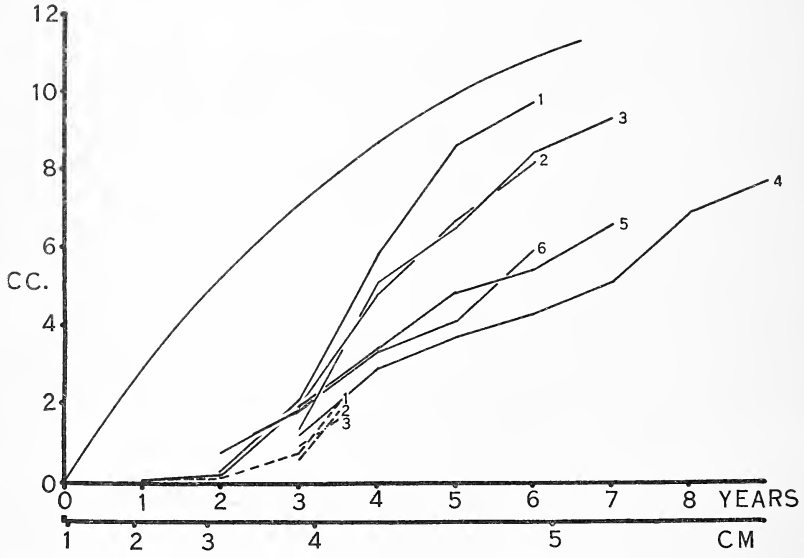

FIG. 3.—Progressive growth of *Balanus balanus* from Port Erin (– – –) and Millport (———) as determined from winter rings; and (upper curve) the relation of volume to length in the Millport specimens.

life. The same factor may possibly account for the difference in growth rate between the specimens from the two localities; on the other hand Darwin (p. 257) records the greater size attained by more northerly occurring specimens of this and other species of barnacles. In the case of *B. balanoides*, at

the end of its second year the length at Herdla—60° N.—is 9·5 mm. (Runnström, 1925); at Port Erin—54° N.—it is 6·5 to 8·1 mm.; and at St Malo—49° N.—it is 5·5 mm. (Hatton and Fischer-Piette, 1932). It would seem that the difference of latitude between Port Erin and Millport would be hardly sufficient alone to account for the observed difference of growth at the two localities.

B. balanoides normally live for about three years, although individuals from very high up the shore may reach an age of five or six years, or perhaps even more. The Millport *B. balanus* seem to have reached an age of five to nine years, and to have been still growing when the pile was drawn.

In conclusion I wish to express my thanks to Mr R. Elmhirst for kindly putting the Millport material at my disposal, and to both him and Mr A. C. Stephen for their suggestions with regard to the examination of the material.

REFERENCES.

Darwin, C., 1854, "A Monograph of the Sub-class Cirripedia. The Balanidæ," *Ray Soc.*, London.

Krüger, P., 1927, "Cirripedia," *Tierweldt der Nord- und Ost-See*, Lief. VIII., Xd.

Hatton, H., and Fischer-Piette, E., 1932, "Observations et Expériences sur le Peuplement des Côtes rocheuses par les Cirripèdes," *Bull. de L'Inst. Océan. Monaco.*, No. 592.

Runnström, S., 1925, "Zur Biologie und Entwicklung von *Balanus balanoides* (Linné)," *Bergens Museums Aarbok*, 1924-25, 1 Hefte, Nr. 5, Natur. Raekke.

BOOK NOTICES

Island Days: a Sequel to "Dream Island." By R. M. LOCKLEY, With sketches by Doris Lockley, and 14 plates from photographs. London: H. F. & G. Witherby, 1934, 8vo, 120 pages. Price 7s. 6d. net. The author of this charming volume cherished an early ambition "to dwell alone with birds and flowers in some remote place," and paid many visits to lonely Scottish isles, his favourite being North Ronay. But when *Dream Island*, his earlier work, was published, we learn that he "renounced celibacy" and took unto himself a life-partner, who spent with him many happy days on Skokholm, a tiny island off Pembrokeshire, which the author re-christened "Dream Island." The present volume is a sequel, and we are now introduced to a third member of the party, "Ann," whom we may regard as a most delightful part of the "sequel," and whose portrait is given (facing p. 52) in one of the most charming photographs we have seen. In this picture she stands, *in puris naturalibus*, with her little arm outstretched towards a handsome specimen of Spiny Lobster (*Palinurus*) resting on a rock at about the level of her chin. It is a delight to read this book, which is full of fascinating details of animal and bird-life, while there is (on pp. 94 and 95) an interesting account of what must have been a migration swarm of the Large White Butterfly (*Pieris brassicæ*), which appeared one day in many thousands and laid eggs "under every leaf" in the lighthouse gardens. We have not space to do more than recommend this delightful volume to the notice of our readers.

Is It Cruel? By T. H. GILLESPIE, Director of the Zoological Park, Edinburgh. London: Herbert Jenkins, Ltd., 1934, 8vo, 182 pages, with illustrations from photographs by M. E. Gillespie. Price 6s. net. It is with pleasure that we draw attention to another delightful volume from the pen of one who is not only a keen lover of animals but a gifted writer whose books are always worth reading. The present work has for its sub-title, "A Study of the Condition of Captive and Performing Animals." The author most assuredly succeeds in proving that, given proper food, shelter, room for exercise and general care, captive animals, almost without exception, are well and happy, and indeed better off than they really are in the wild state, where there is a continual struggle for existence which resolves itself into the two main factors of ceaseless hunting for food and a never-ending menace from their natural enemies. When properly housed they very soon become accustomed to their new surroundings, many showing quite early their personal likes and dislikes, and often recognising that man is really their friend and protector. Even the travelling box in which they arrive at the Zoo is regarded as a home, and "sometimes it is difficult at the end of a journey to induce them to leave the place they have become used to for the enlargement of their new home." A good deal of criticism is given to the so-called tricks of "performing" animals, such as a lion leaping through a hoop

or on to a shelf, which feats are quite easy for it. The actual training of animals "need not," according to Mr Gillespie, "involve, and seldom, probably never, does involve, any more 'cruelty' than is necessary to teach a child to dress itself or behave itself at table, and not perhaps so much as is required for the breaking-in and driving of a horse." The illustrations in this volume, all full-page photographs, are 16 in number, all excellent and well chosen. The name of the publisher is a sufficient guarantee of the printing and general get-up of a book which should, and probably will, be very widely read.

The Naturalist on the Prowl. By FRANCES PITT. London: Country Life, Ltd., 1934, 8vo, 137 pages and 36 photographs by the author. Price 5s. net. Thanks to the passing of the Wild Birds' Protection Acts the study of feathered creatures is now chiefly a matter of close personal observation, and birds are "shot" by the camera instead of by the gun. The proper equipment for taking pictures of avian life in its natural surroundings and the successful use of the apparatus is largely a matter of experience. But it is a great economy of time, to say nothing of the saving of expensive plates and films, to read a volume like that now before us, and learn, before venturing into the field, what to do and what not to do. We can take it for granted that anything such a well-known authoress has to say on the subject is excellent advice, and the success and extreme beauty of her illustrations show at once that we are safe in her hands. In this excellent and wonderfully cheap volume we find a series of most useful and practical hints on the construction of the "hide," the management of the camera, the proper selection of lenses, plates, and films, and many other points connected with the acquisition of successful bird-pictures. The chapters throughout are studded with interesting reminiscences and the book altogether is a delight to read.

The Behaviour of Animals: An Introduction to its Study. By E. S. RUSSELL, D.Sc., F.L.S. London: Edward Arnold & Co., 1934, 8vo, 184 pages, with 6 photographic plates and 26 text-figures. This is a valuable addition to the literature on animal behaviour. The various chapters are founded upon lectures delivered at University College, London, and deal with the method of approach, behaviour and ecology, maintenance activities, instinctive behaviour, the development of behaviour, "insight" learning, animal perception, and the difficult "Gestalt" theory introduced in connection with human psychology by B. Petermann in 1932. The subject is introduced in a simple manner, but as the book proceeds the reading naturally becomes more difficult, as one might expect. But the text is lightened by the narration of numerous interesting experiments, each of which is selected to illustrate some particular phase of behaviour. The book is well written and beautifully printed, while a very useful bibliography is given at the end of each chapter.

Insects as Material for Study. By G. D. Hale Carpenter, D.M. Oxford: the Clarendon Press, 1934, 8vo, 38 pages, with frontispiece. Price 2s. 6d. net. This interesting brochure is a reprint of two inaugural lectures delivered by Professor Carpenter in November 1933. The first deals with the part that Insects have played in illustrating some of the fundamental principles of biology, the rôle of these creatures in spreading disease, insect parasites, courtship, and other subjects of the greatest interest to the scientist in general and the entomologist in particular. The second lecture gives a very readable account of that fascinating subject *mimicry*, a subject to which the author has given much atttention. As Hope Professor we may look forward with confidence to the future researches of the author of this valuable booklet. He is a worthy successor to the distinguished entomologist, Professor Poulton, who has done so much to elucidate the problems connected with insect colouration, and whose name is familiar to the entomologists of the world.

We have been favoured with a copy of the *South-Eastern Naturalist and Antiquary*, being the Proceedings and Transactions of the South-Eastern Union of Scientific Societies for 1933. This issue includes an account of the 38th Annual Congress, held at Norwich in June of last year. The volume runs to 119 pages and contains several papers of interest to the naturalist. Among these may be mentioned: The Influence of Man on Vegetation, by Professor E. J. Salisbury; Application of the Spectroscope to Biology, by Hugh Ramage; Rotifera and Polyzoa in Norfolk Broads, by H. E. Hurrell; Birds of the Broads, by Major Anthony Buxton.

The Royal Society for the Protection of Birds has issued a valuable pamphlet by G. B. Blaker on **The Barn Owl in England and Wales.** The price is only one shilling, and we strongly advise every bird lover to procure a copy from the Society, 82 Victoria Street, London, S.W. 1. The pamphlet gives details of a census which was undertaken to test the correctness of reports that the Barn Owl was noticeably diminishing in numbers in many parts of England and Wales. The results have proved, most unfortunately, that a decline in numbers has actually taken place. For this diminution in population, three factors are given as responsible: (1) interference by man, (2) the destruction of nesting sites, and (3) the limitation of food-supply. In addition many deaths may be attributable to poisoning, mainly through the habit this bird has of swallowing rats, some of which may have been killed by some poisonous chemical. Since the Barn Owl is of service to man it is hoped that its decrease in numbers may soon be checked. The publication of this pamphlet is timely and is to be commended, since it draws special attention to a serious state of affairs which can be largely mitigated by the efforts of those who are interested in the preservation of our native fauna.

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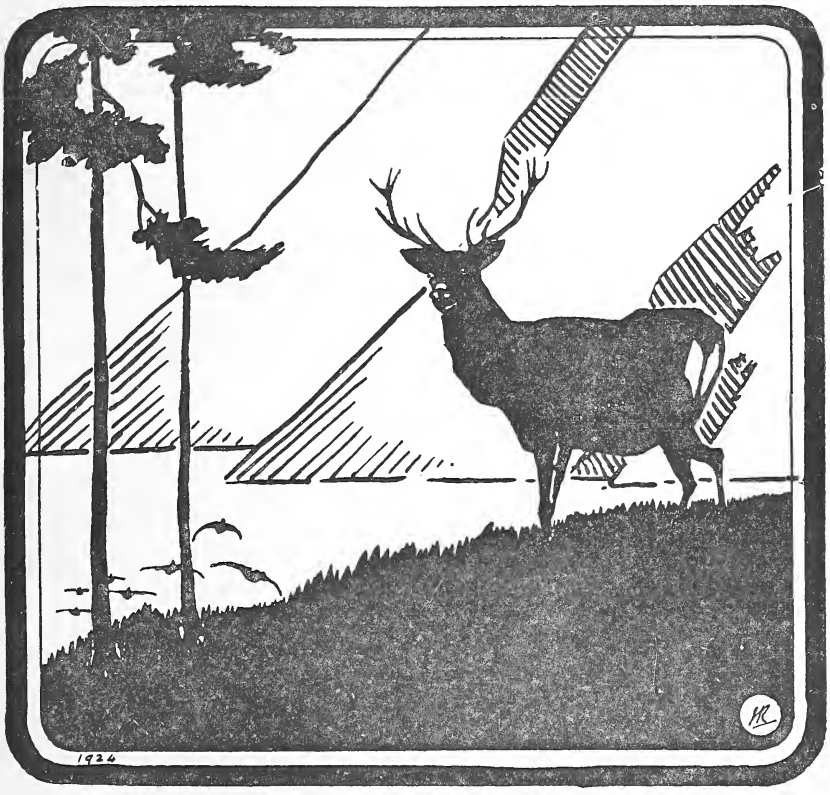

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Part of Dry Harbour at half-tide showing Tertiary intrusion in Lewisian gneiss.

Tertiary Dyke invading Lewisian gneiss, north-west of Dry Harbour, Rona. The gneiss at the edges of the dyke has been eroded away by the sea to form marginal gullies.

[*Photographs by Edith Philip Smith.*

(*Authors are responsible for nomenclature used.*)

The Scottish Naturalist

No. 209] 1934 [September-October

THE NATURAL HISTORY OF SOUTH RONA.

THE RESULTS OF A BIOLOGICAL EXPEDITION FROM UNIVERSITY COLLEGE (UNIVERSITY OF ST ANDREWS), DUNDEE, JULY 1933.

Edited by Professor A. D. PEACOCK, Dr EDITH PHILIP SMITH, and C. F. DAVIDSON, B.Sc.

I. NARRATIVE.

By Professor A. D. PEACOCK.

THE idea of making this expedition to the Inner Hebridean Island of South Rona was due to Messrs C. F. Davidson and W. Keir, two senior students, and it was their representations to staff and students in the biological departments which finally brought their idea to fruition. The scientific aims of the expedition were:—(1) to provide students with an exercise in ecological work; (2) to make such an ecological survey as time and opportunity permitted; (3) to obtain material for purposes of teaching and research.

Organisational arrangements, naturally, were mainly determined by conditions known to exist on the island, and on these matters we had the good fortune to benefit by the experience of Mr Davidson who had carried on geological research there on more than one occasion.

The expedition consisted of two parties whose personnel, with their special activities, are here given.

FIRST PARTY: JULY 2-17; LEADERS: Dr EDITH PHILIP SMITH and Mr C. F. DAVIDSON.

GEOLOGY: Mr C. F. Davidson, B.Sc.

BOTANY: Dr E. P. Smith and Miss G. Dickinson, B.A., L.-ès-L.

ZOOLOGY: Miss Margery Walker, B.Sc., Mr J. Millar, B.Sc.

MARINE ZOOLOGY: Dr Henry Williamson.

GENERAL: Mr W. S. Garriock, Mr S. MacLean, M.A. (of Raasay and Edinburgh University).

SECOND PARTY: JULY 17-31; LEADERS: Prof. A. D. PEACOCK and Mr C. F. DAVIDSON.

GEOLOGY: Mr C. F. Davidson.

ZOOLOGY: Prof. A. D. Peacock, Dr Ann R. Sanderson, Mr F. Greenshields, B.Sc., Mr G. H. Harrison, B.Sc. (Agric.) (Armstrong College, University of Durham).

SURVEY: Mr W. Watt, B.Sc., assisted by Miss Joan Peacock.

CINEMATOGRAPHY: Mr B. G. Forbes (Dundee).

GENERAL: Mrs Peacock, Master Alan Peacock, Messrs K. Bolam and B. Noble (Newcastle-on-Tyne).

ACKNOWLEDGMENTS.—For permission to stay on the island we are indebted to the Department of Agriculture for Scotland, and we thank the Department's Factor, Mr Alec MacCallum of Portree, for his practical interest in us. The County Council of Inverness rented to us the empty schoolroom and house on the island. The Commissioners of Northern Lights kindly allowed us to copy meteorological data collected by Messrs Fraser and Davidson, the present Rona Lighthouse keepers, and by their predecessors; and, further, arranged postal radio facilities with the Island of Lewis in case of emergency.

The three inhabitants of the island, Messrs Christopher and James Macrae and Miss Macrae were most neighbourly, their gifts of fresh milk and crowdie being the more welcome as such formed our only fresh food.

We specially thank the Students' Scientific Society and the Council of University College, Dundee, who generously made us financial grants which went far towards covering the basic expenses of transport of scientific equipment and of the hire of the yawl which carried us to and from Portree.

We also thank the Carnegie Trust for a grant in aid of publication.

Professor Fulton, University College, kindly furnished us with surveying equipment.

The services of those specialists who have assisted us in naming specimens will be seen by reference to the appropriate identification lists and to other papers which appear later. Meanwhile we give them, collectively, our warm thanks.

The details of the scientific work of the various members will also be apparent from the papers and lists which follow, but it is a pleasurable duty to place on record a few facts of general interest. Each scientific member of the expedition, of course, had particular interests, but, whenever occasion offered, assisted the specialist aims of other workers. The non-specialists rendered like service. Various members took cameras and their photographs have been pooled for record and lantern slide purposes. Our cordial thanks are due to Mr S. MacLean, of Raasay and Edinburgh University, whose native Gaelic, and whose knowledge of the islands and their people, smoothed and informed our way. To Mr B. G. Forbes we owe a great deal. He lent us a portable wireless set and was indefatigable in his cinematographic activities. He obtained a most interesting and successful 1200 feet length of 16 mm. film, his "shots" of the scenery and atmosphere giving beautiful representations of the striking characteristics of the island. In portraying the general life and work of the expedition he took throughout the point of view of the sympathetic layman first making acquaintance with folk working in a world different from his own. His adaptability and wide experience (he is an old campaigner) and his genial personality were great assets to us. Messrs Bolam and Noble, with their technical experience, rendered useful service in the survey of the cave, and Messrs Keir and Watt, by prolonging their camp into August, increased our

spoil. Lastly it would be difficult to estimate our indebtedness to Mr C. F. Davidson, who stayed with both parties, and without whose intimate knowledge of the island and excellent staff work we should not have fared so well, and without whose good company we should have been the poorer.

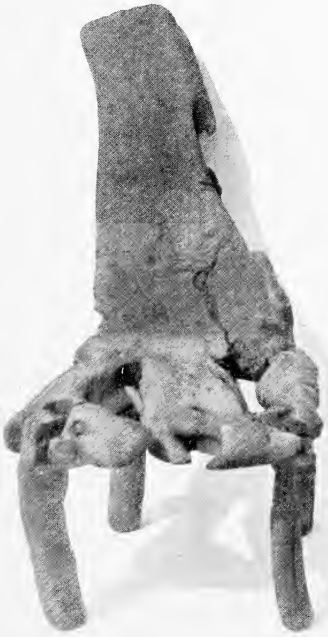
ORGANISATION.—Each member of the expedition was responsible for personal travelling and messing expenses, and for a small amount to cover the cost of camp equipment and of sea-faring by the hired yawl which took us from and back to Portree. As the island was deserted it was necessary for us to be self-sufficient regarding food, bedding, lighting, and camp equipment. A small quantity of coal was taken, and scrap wood from the ruined crofts was utilised for heating water, and, in the case of the second party, for drying clothes and shoes. A great proportion of our food was tinned though we took a fortnight's bread (along with paraffin oil) from Portree and were careful to lay in an ample supply of oranges and lemons. As mentioned, the Macrae family gave us fresh milk and crowdie. We lived very well, however, though our actual messing came only to the modest sum of a pound a week each.

The schoolhouse has three fairly large rooms and two "cubby holes." These housed the majority of each party, though hardier and younger male members slept in precariously anchored tents, pegging being difficult because of the absence of soil above the native rock. The large schoolroom, with its desks, was used as a combined larder, kitchen and mess-room whilst one of the ground floor bedrooms during the day served as a laboratory.

The scientific equipment—glass ware, microscopes, books, etc., was mainly packed in commercial boxes of three-ply wood, these same boxes serving as laboratory tables.

The weather conditions of the first fortnight were very good, but during the second period there was a fair amount of rain which rendered working and living conditions somewhat difficult at times. Mosquitoes, midges and clegs were always with us and our special ointment of white birch wood oil contained too much vaseline to be a successful preventive.

Dry Harbour, Rona, at low tide. A submerged forest was examined by digging in the tidal muds, and the numerous seaweed-covered boulders have been transported to this locality to form a seaweed farm. The remains of a stone dyke converting the Harbour into a fish trap are seen in the top right corner. [*Photo : W. Watt.*



A chair found in one of the ruined crofts ; height, 27 in. ; depth of seat, 13 in. ; seat and back are in one piece and were fashioned from a single tree root, the species of which remains undetermined.

A certain measure of relief from the irritation of the bites was obtained by applying a 1 per cent. solution of iodine in carbon tetrachloride to the bitten place. Another plan was to rub the spot (not too heavily) with a nail-brush well smeared with soap. Regarding the attacks of clegs the interesting observation was made that, whereas the dark trousers of one member of the party served as a resting place for large numbers of the flies, his white shirt acted as a repellant. This reminds us of the fact, first noted by Nuttall and Shipley, that light colours, especially yellow, are repellant to mosquitoes.

Outline of Results.

In the following section brief references are made to the more outstanding features of the papers, by various authors, which deal with particular aspects of our work.

Archæological, Physiographical and Geological. —Like St Kilda and many another Hebridean island Rona affords an illustration of how changing conditions in the world at large have reacted to bring about depopulation and virtual desertion. In 1841, 1861, 1871, 1881 the population numbered 165, 147, 157, and 159 respectively; at the end of the 19th century only 21 families were shared among the three villages of Dry Harbour, Doire na Guaile and Bhraig. To-day only the small farm, with its three inhabitants, remains at Big Harbour. At Dry Harbour some 70 buildings of all sorts, and in all degrees of delapidation, can be traced.

Detailed geological studies of Rona have engaged Mr C. F. Davidson's energies during the past three years and their technical nature renders them more suitable for publication elsewhere in specialist periodicals. In his paper of this series, therefore, he confines himself to more general aspects, but presents, in addition, an account of the findings made in our preliminary survey of the largest of three caves. To the layman the island appears to be little else but rock and bog, and even geologically it can be simply described, for it is essentially a mass of Lewisian gneiss through which run several igneous intrusions of Tertiary age. The caves on

the east side are about 90 feet above sea-level while a submerged forest lies on the west coast, and these facts, together with other evidence from this island and the Hebrides generally, perhaps indicate that post-Tertiary tilting has occurred. The cave explored presents two aspects of human interest, for, roughly furnished from the native rock, it was used as a place of worship at the time of the Disruption of the Church of Scotland in 1843, and, long prior to that, as a place of residence or refuge by some type of primitive folk. The condition of the cave to-day is illustrated by a plan based on the survey of Messrs Noble and Bolam. As the result of digging at the mouth we obtained animal remains—bones of ox, sheep, seal, and otter, together with enormous quantities of shells of various edible mollusca—but failed to obtain any artefacts. We are therefore unable to date or to identify the type of culture of those who used the place and must be content with remarking that the appearances disclosed had a neolithic aspect and gave us a glimpse of the food problems of a folk that eked out an extremely primitive existence.

BOTANICAL.—In an ecological paper Dr Edith Philip Smith presents several interesting photographs illustrating most of the 17 types of vegetation she distinguishes as follows:—(*a*) Natural: salt marsh, lowland marsh, upland marsh, moor, peat-bog, hill pasture, cave, fresh-water aquatic, thalassiophyta, woodland, rock community; (*b*) Affected by human agency: planted wood, arable, roof-top, peat-cuttings, "seaweed farm," various. Certain *p*H estimations made by Mr F. Greenshields are incorporated. Of flowering plants about 180 species were collected, and of algæ, about 20. As Dr Smith points out, Rona affords an interesting case of reversion to the wild within very recent years.

ZOOLOGICAL.—The bird life is not rich, our efforts at trapping small rodents were unsuccessful, and the season's fishing was poor, so it is not surprising that our principal zoological collections were planktonic and entomological. Mr C. F. Davidson records a small collection of 38 species of marine mollusca, 22 larger species being taken from the vicinity of Dry Harbour and 16 from tow-nettings made in

the laminarian zone of Big Harbour. The plankton material, collected mainly under Dr Williamson's supervision, remains still to be worked out.

A large proportion of the insect captures has been handled by Mr G. H. Harrison and his records of species show the following:—earwigs 1, short-horned grasshoppers 3, scorpion flies 2, dragonflies 9, leaf-hoppers 9, beetles 38, humble bees 4, ants 3. The records concerning dragonflies (found as naiads and adults) and the leaf-hoppers are noteworthy. The material of the latter group is now serving as research material for Mr Harrison.

The saw-flies, all found as larvæ except in one case, number about a dozen species. Five of these have been identified but the others will only be determined after rearing. As parthenogenesis in this group is a particular study in my department special attention was directed to rearing as many kinds of larvæ as possible in the hope of obtaining strains for laboratory experiment. So far this hope has been realised in the case of *Pteronidea nigricornis* Lep. which was taken on sallow.

The collection of butterflies and moths was a good one, some 60 species being taken, either as larvæ or adults. We are greatly indebted to Professor J. Heslop Harrison for naming them and for pointing out that the Dark Green Fritillary obtained is a melanic variety. Its characteristics and status are discussed later.

Mr P. H. Grimshaw has been good enough to name the two-winged flies, fifteen species, and Mr W. S. Bristowe, who has himself collected in the Hebrides, reports that the twenty or so species of spiders provide material for an interesting list.

It will be gathered then that the first aim of the expedition was amply fulfilled, everyone gaining much from the experience. Regarding the second aim it may be said that a foundation has been laid for future studies in the plant and animal ecology of the island, as much as could be hoped for in the time available. Finally, apart from obtaining specimens for demonstration and teaching purposes, living material was successfully transported for future research.

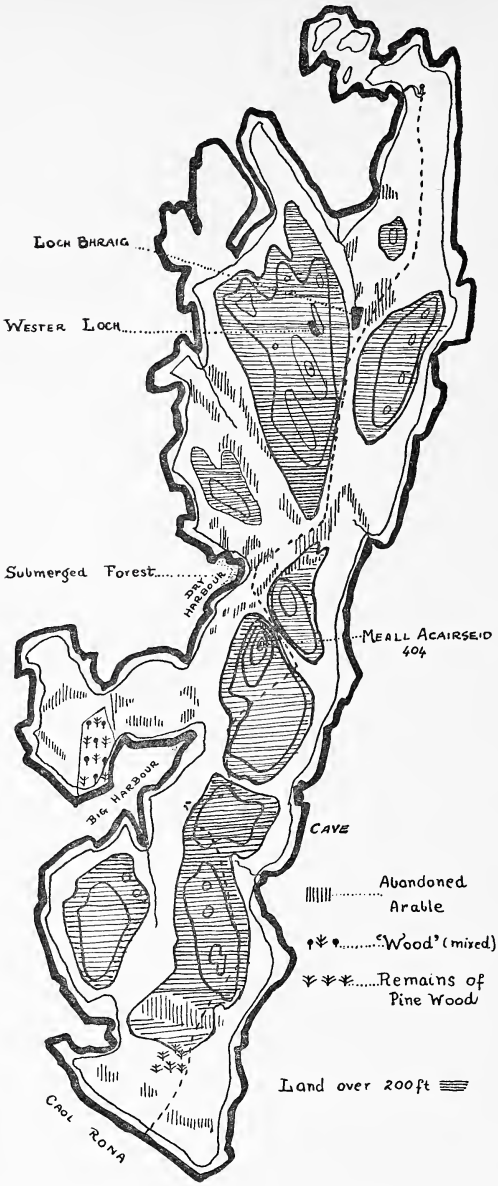


Fig. 1.—South Rona. The island is nearly 5 miles long. Drawn from the 1 inch Ordnance Survey Map.

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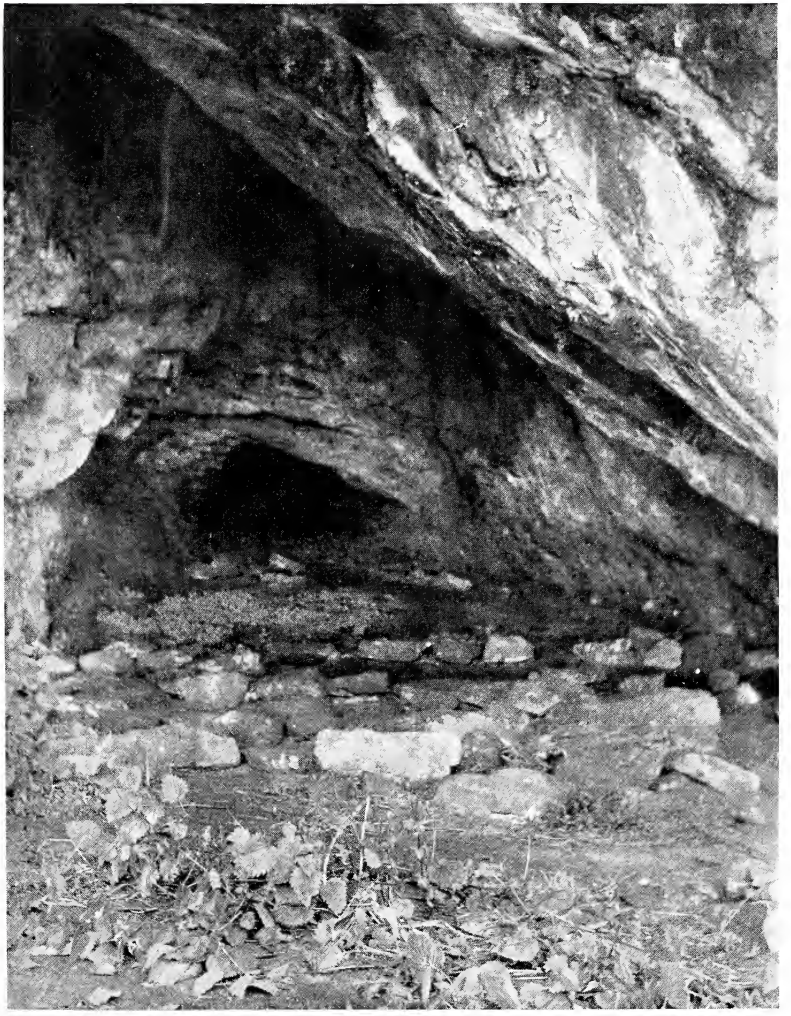

Photograph of Cave.

II. THE PHYSIOGRAPHY AND GEOLOGY OF SOUTH RONA.

By C. F. Davidson, B.Sc.

Physiography.—The island of South Rona is close on five miles in length, with an average breadth of about one mile. It is elongated with the longer axis in a north-south direction, and is separated from the similarly oriented island of Raasay to the south by Caol Rona, a swift-flowing strait rather less than a mile wide. Numerous small islets and skerries are evident off the western coast and in Caol Rona, but are relatively rare on the east, where the ten-fathom line is immediately inshore and where the land drops rapidly to depths of over 100 fathoms.

The eastern coast meets the sea in a conspicuous series of steep cliffs and is comparatively unbroken by natural inlets, but the bays of the west form natural harbours for fishing boats and yachts, and are the centre of important lobster fisheries. There are no large streams, due to the absence of an adequate gathering ground, but a good water supply can be obtained, even in a very dry season, from two wells in the village of Dry Harbour. Two small seasonal lochs, held up by peat, are observable near the deserted village of Bhràig: it is of some interest that one of these is omitted on the Ordnance Survey 6 inch sheet.

The highest point of the island, Meall Acairseid, is a conspicuous hill, 404 feet in height, overlooking Dry Harbour. From the summit a great part of the bare and rocky surface of the island is visible, and the small shallow peaty valleys are seen to be uniformly oriented into two intersecting groups, of north-north-westerly and of north-easterly trend respectively. Throughout these valleys evidence of former cultivation and drainage are commonly present, but to-day the only cultivated ground is a small patch under potatoes, laboriously tilled with the "càs chrom" or Hebridean foot plough, at Dry Harbour, and an enclosed domestic garden at the Rona lighthouse. There is a little pasture on which cattle are reared at Big Harbour.

Although the climate is moist, the rainfall of South Rona is decidedly lower than that of many of the islands to the west, which form the first barrier to the rain-bearing winds from the Atlantic. The average annual rainfall at the Rona lighthouse during the five years 1928-1932 was 31·95 inches. During the first six months of 1933, 12·28 inches of rain had fallen, a figure not far from the average. The heaviest rains fall in October, November, December and January, and dry spells are commonest in spring and early summer. Snow rarely falls, and never lies for any length of time. The prevailing and the strongest winds are from the south and south-west, easterly winds from the mainland being rare and of low intensity.

GEOLOGY. — The island is formed of a complex of Lewisian gneisses which were first surveyed in detail by Sir J. J. H. Teall during a month's stay at the Rona lighthouse in 1887. The results of this investigation are incorporated in a few notes appearing in "The Geological Structure of the North-West Highlands of Scotland" * and in the Geological Survey 1 inch sheet 81.† A resumé is given in the posthumous work of Peach and Horne on *Chapters on the Geology of Scotland* (1930). The barren and rugged character of the gneisses is commented upon by Macculloch, Robert Jameson, and Dr Johnson, among other early travellers in the Hebrides.

It is not proposed to deal in any detail with the petrography of the Lewisian gneiss in this publication. As noted by Teall, hornblende-pyroxene-gneisses, hornblende-biotite-gneisses, and hornblende-epidote-gneisses are dominant. Many of these are remarkably coarse in grain, and augen-structure is not exceptional. In certain biotite-gneisses the biotite occurs in large brownish-green plates four or five inches in diameter. Aplitic gneisses poor in ferromagnesians may be observed near the summit of Meall Acairseid. Where intrusive junctions are discernible, the acid rocks are seen to form the latest members of the complex.

In the neighbourhood of the schoolhouse the gneisses

* *Memoirs of the Geological Survey*, 1907.

† 1st edition, 1896 ; 2nd edition, 1921.

exhibit many inclusions of coarse hornblende rock. Numerous bright pink pegmatites of arresting appearance display sharp junctions towards the parent rock, which they penetrate as thick transgressive masses. They are formed dominantly of a milky quartz and pink microcline, not uncommonly in graphic intergrowth, the crystals of felspar at times attaining nine or ten inches in diameter. It is possible that these felspar-rich modifications may be of economic value. At times large irregular plates of biotite, three or four inches in diameter, are associated with the quartz and felspar. Dykes and sheets of hornblende-schist, bearing numerous schlieren and segregations, are everywhere abundant, exhibiting transgressive junctions. At one locality on the eastern coast a dyke of hornblende-schist is cut by a late acid pegmatite.

The remaining pre-Pleistocene rocks of Rona belong to the Tertiary system, and are intrusive igneous rocks which constitute a small part of the great swarm of basic dykes of north-north-west trend traversing the northern Hebrides. The Rona intrusions are of abnormally alkaline olivine-bearing types, the largest mass forming a great elongated boss of teschenite. The Tertiary igneous rocks will be described in detail in a forthcoming publication.

During the Pleistocene glaciation, the island was covered by a *mer-de-glace* which moved outwards from the mainland in a north-westerly direction; and although glacial striæ are rare, the effects of the glaciation are seen in the barren and mammillated nature of the rock surfaces, which in many cases form *roches moutonnées*. All the higher hills are free from drift, and only in a few small valleys may the relatively rare deposits of boulder clay be observed. Erratic boulders are quite common, the most important types foreign to the island being red Torridonian sandstones and arkoses, derived probably from the mainland, but perhaps from the island of Raasay to the south, where the Torridonian sediments may be seen unconformably overlying the Lewisian gneissic landscape between Brochel and Loch Arnish.

No well-developed raised beaches or high level clays have been discovered in Rona, but the existence of a submerged

forest, three feet below high-water level, has been determined at Dry Harbour. The flora, dominantly birch and hazel, apparently belongs to a period when hazel was more abundant on the island than it is to-day. It may be noted that both Dry Harbour and Big Harbour can be regarded as submerged landscapes.

SPELÆOLOGY.—A number of high-level caves, unnoticed on the Ordnance Survey maps or Admiralty charts, were examined on the eastern coast of the island. An excavation was undertaken in the hope that traces of early occupation might be discovered, but unfortunately it was not possible to spend more than two days on this work, and progress was hampered by the lack of adequate excavating tools. Nevertheless, the few results are placed on record in the hope that some future worker may make a more prolonged and detailed investigation.

The caves, three in number, have been excavated by the sea acting along lines of weakness in the gneiss, of north-west or north-north-west trend. They are situated at heights of from 80 to 95 feet above sea-level in a bluff rather precipitously overhanging the shore, at the locality shown in the accompanying sketch-map. The largest cave, that at the highest horizon, was used as a church by the islanders after the 1843 Disruption, and there may still be seen rows of rude gneiss boulders used as seats, a great mass of gneiss in the cave mouth forming a pulpit stone, and a circular font of small angular cobbles fed by drops of water from a plane of weakness in the roof. Apart from this scanty water supply the caves are perfectly dry.

The largest cave consists of two main parts, the dimensions of which are shown in the accompanying plan, based upon sketch-maps for which I am indebted to Mr Basil Noble. A large outer room extends inwards from the entrance for about fifty feet, separated from a low dry inner room by a narrow shelving gallery seven feet or so in breadth. A similar gallery is seen in a lower cave, and they are presumably due to the shelving of beach material when the caves were situated at sea-level. Detailed trenching was impossible, but an excavation was made in the loamy floor

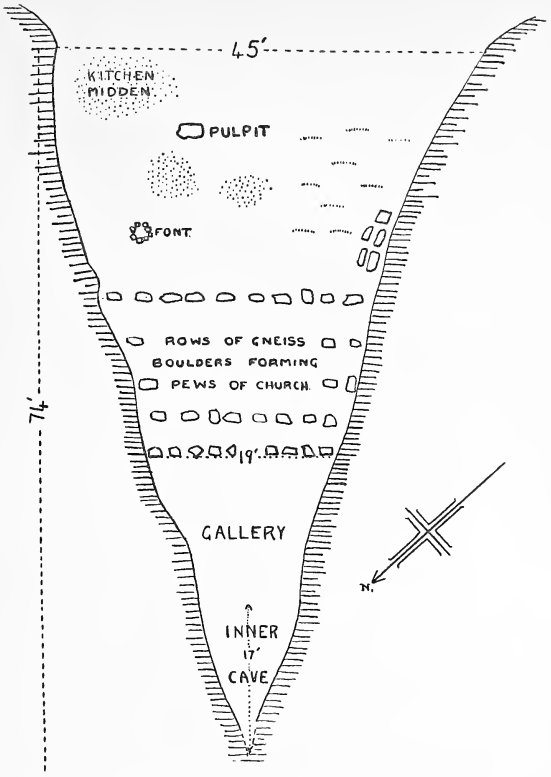

FIG. 2.—SKETCH PLAN OF CAVE, SOUTH-EAST RONA.

The excavated areas are stippled. Height of cave 45-50 feet diminishing to ground level.

of the highest cave near to the entrance, where the following section was uncovered:—

8.	Brown loam	2 inches.
7.	Greyish-white ashes	½ inch.
6.	Peat and vegetable debris	1-1½ inches.
5.	Greyish-white ashes	1-1½ „
4.	Peat and vegetable debris	1-1½ „
3.	Greyish-white ashes	3 inches.
2.	Black peat and vegetable debris, with much bracken	2+ inches.
1.	Rock debris (not penetrated)	1 foot, 2 inches.

The numerous animal remains from the hearths in this section were submitted to Miss Margery I. Platt, of the

Royal Scottish Museum, who has kindly identified them as follows:—

7. Ox, sheep, bird, fish remains (probably cod), jaw of otter.
5. Ox, sheep. 3. Ox, sheep.

Fragments of burnt peat and charred wood, either hawthorn or rowan, are common, and a considerable number of the bones, sometimes charred, have been broken or split by human agency. The shells of *Littorina littorea*, *Patella vulgata*, and *Ostrea edulis* are common throughout.

Excavations in the inner cave revealed

Cave earth (not penetrated) . . .	2½ feet.

To the east of the entrance a kitchen midden was found, thousands and thousands of shells forming the entire deposit. The following section was uncovered:—

Peaty cave earth	6 inches.
Patella vulgata with *Littorina littorea* and occasional *Ostrea edulis* . . .	2 feet.
Mytilus edulis with rare *Patella vulgata* .	2 inches.
Sand containing *Patella vulgata* . .	1 foot.
Rock debris	not penetrated.

It is noteworthy that all the molluscs—*Mytilus edulis*, *Ostrea edulis*, *Patella vulgata*, *Littorina littorea*—are edible species. *Cardium edule* is not present, shallow, sandy or mixed bottoms being rare in Rona waters. Although the adjacent coast abounds in *Purpura lapillus* and various *Trochi*, no examples of these inedible shell-fish were found in the cave. From the kitchen midden Miss Platt identifies the following:—Ox (one horncore reminiscent of a Highland variety), sheep, young seal, lower jaw of adult seal (*Phoca vitulina*, L.), bird bones (probably gull) and fish bones. The bones of ox and sheep have been split open to allow the marrow to be extracted.

The bedding is horizontal and the shell seams show no sign of deposition in a pit. No flints, hammer-stones, or pottery were discovered, but it should be noted that the surrounding Lewisian gneiss breaks into rude angular fragments which are not unlike implements, and which may have been used as such.

A second cave at a lower level, to the north of the largest cave, is also of large size, and has been used in recent years as a shelter for sheep and cattle. A second kitchen midden was found here, at the cave mouth, but it lies under a great accumulation of fallen boulders up to a ton or more in weight. No excavation was made. Sections at the entrance and in the interior of this cave revealed three feet of cave earth, overlying rock debris which was not penetrated. No signs of habitation were discovered.

A third cave, to the south of that first described, is shallow and does not penetrate any great distance. It has not been excavated.

There are no well-developed raised beaches in Rona or northern Raasay, and the identification of possible strand lines is further complicated by the probable occurrence of post-Tertiary movements of tilting. It appears very likely, however, that the Rona caves were well above sea-level in neolithic times, and it is to be regretted that no implements indicating the age of the occupation of the caves were discovered. Further excavation to bed rock or to beach gravel might yield convincing evidence of early occupation.

Considering the marked cultural lag between the remote islands of the Hebrides and the mainland of Scotland which exists to-day, and which may have been even more prominent in early historical times, it is obvious that no attempt can be made to date the remains here uncovered. They are certainly of neolithic aspect, but they may equally well represent an occupation of these caves in mediæval times. Whatever age they are, they throw an interesting sidelight upon the food problems of the primitive inhabitants of a little-known part of Scotland.

(*To be continued.*)

NOTES

Pied Flycatcher in Perthshire.—While watching a pair of Long-tailed Tits carrying out building operations in the forked trunk of a birch my attention was suddenly arrested by a strange song. Perhaps a local variation of the song of a Cole-Tit? But as the song—gay, jerky, short—as if keeping time with a branch-to-branch flight, came nearer, I realised that the songster was no familiar friend of mine. Closer and closer it came, now it sounded out of the leafy depths of a big bushy birch not ten yards away. Suddenly the gay songster appeared out of the leaf and perched itself on the supreme tip of a dead branch where it gaily held forth.

The bright early morning sun shone from behind it and I had no glasses with me! I was completely puzzled; the song contained notes which recalled the song now of the Marsh Warbler, now of the Redstart, and again of the Black Redstart; the cadence of it reminded one of the warble of the Willow Warbler.

For quite three minutes it sat there singing unceasingly when suddenly it flew across to the next tree, also a birch, and thrust half its body into the old nesting hole of a Greater Spotted Woodpecker. It was evidently feeding its sitting mate, then it disappeared into the hole where it remained for some twenty seconds; out it came and flew on to an adjacent tree. Now the sun being in my favour, in a second its identity flashed across me—a Pied Flycatcher, the first I had seen in this country.

For two mornings I was able to watch this confiding and entertaining warbling Flycatcher. Unfortunately, I was not able to continue my observations, but let us hope by now there is a nestful of well-nourished and trusting fledglings which will return next spring to their native glen in Perthshire.—Ronald Campbell (Colonel).

Long-finned Tunny (*Thynnus germo*) in the Holy Loch, Argyll.—A specimen of this fish was taken at Kilmun, in the Holy Loch, Argyll, on the 20th June 1934. A photograph of the fish and a drawing giving the measurements were forwarded to the Royal Scottish Museum by Mr Thomas Malloch, Johnstone. The length from the tip of the snout to the fork of the tail was 44 inches and to the tip of the tail fin 47½ inches. The long pectoral fin measured 18 inches and the weight was 56 pounds. While this fish is widely distributed in the Mediterranean and in the Bay of Biscay it rarely wanders to Scottish waters, there being only two previous records—one from the Orkney Islands in June 1900 and the other from Loch Gilp in November 1933 (see Scot. Nat. 1933, p. 26).—A. C. Stephen, Edinburgh.

NOTES ON THE BREEDING BIRDS ON THE ISLAND OF HOY, ORKNEY.

By William Serle, Junior.

Hoy is the westernmost of the Orkney Islands. It is bounded on the west by the Atlantic, and here the line of great cliffs (which reach an elevation of over 1000 feet) is broken only once in its extent of 15 miles—at Rackwick Bay. The eastern shore is less rugged and is separated from the Mainland of Orkney by Hoy Sound and Scapa Flow.

The following notes were compiled during a fortnight's stay on the island in July 1933, augmented in a few specified instances by records made in the course of a few days' stay in 1930 and 1931. My father spent part of June on the island, and I was helped by his determination of breeding localities in working out the distribution of certain species.

Raven.

Corvus corax corax.—Parties of two or three occasionally seen hunting on the hills or along the cliff-tops. I know of one inland crag where they nest every year, and there are probably at least two pairs breeding on the high cliffs on the west side of the island.

Hooded Crow.

Corvus cornix cornix.—Considering the absence of persecution, and the ample supply of food in the breeding season in the form of eggs and young birds, it is strange that this species is not commoner. The Crows in Hoy are remarkably tame as compared with their kin nearer civilisation, and it is possible to approach within a dozen paces of a family party before they take flight.

Rook.

Corvus frugilegus frugilegus.—There is a flourishing colony at the north end of Hoy. On 8th July I counted approximately one hundred Rooks (including young) resting in a corn-field. The nests are built in a plantation of stunted deciduous trees, many of which are dead or dying from the effects of the excrement.

Starling.

Sturnus vulgaris vulgaris.—An abundant species, nesting in burrows and in holes in the dry-stane dykes when more usual sites are not available.

House Sparrow.

Passer domesticus domesticus.—Common wherever there is cultivated land.

Linnet.

Acanthis cannabina cannabina.—A local bird found in some numbers, especially round Melsetter, where there is a fair extent of arable land by the sea.

Twite.

Acanthis flavirostris flavirostris.—A well and evenly distributed species seemingly not partial to any particular kind of country. On the 4th August 1930 I found a nest of this species with c/5 eggs, fresh, in a sheltered cove in South Walls.

Corn Bunting.

Emberiza calandra calandra.—Wherever there is land under the plough the Corn-Bunting is found breeding abundantly. The males sing lustily right into August.

Reed Bunting.

Emberiza schœniclus schœniclus.—I have only one record for this Bunting, namely one pair—by their behaviour breeding—in South Walls, in 1930.

Skylark.

Alauda arvensis arvensis.—An abundant species; absent from the wilder hill-tops.

Pied Wagtail.

Motacilla alba yarrellii.—A rather scarce resident, found only in the vicinity of cultivated land.

Meadow-Pipit.

Anthus pratensis.—An evenly distributed species.

Rock Pipit.

Anthus spinoletta petrosus.—A very abundant breeding bird.

Song Thrush.

Turdus philomelos clarkei.—A not too common resident.

Blackbird.

Turdus merula merula.—Fairly well distributed.

Stonechat.

Saxicola torquata hibernans.—There were three pairs of Stonechat, whose territories adjoined, feeding young on the Rackwick Burn, in the first week of July. I found a fourth breeding pair on the Heldale Burn.

Wheatear.

Œnanthe œnanthe œnanthe.—I located seven pairs breeding in the north half of the island, nesting in widely differing situations—the dry-stane dykes surrounding the crofts, the scree of the steep hill-slopes, and the boulder-strewn shore at the base of the great cliffs.

Hedge Sparrow.

Prunella modularis occidentalis.—I noted a Hedge-Sparrow at Melsetter on the 15th July, so very possibly this species nests on Hoy.

Dipper.

Cinclus cinclus gularis.—Noted on the Rackwick Burn, where the bird is said to breed nearly every year. [A good record—the bird has formerly only been ranked as an occasional visitor to Orkney.—Eds.]

Wren.

Troglodytes troglodytes troglodytes.—An ubiquitous resident. One day—within an hour—I discovered four pairs with their young in the rank heather by the side of the Rackwick Burn.

Short-Eared Owl.

Asio flammeus flammeus.—Seen occasionally. It is impossible to estimate the status of this unobtrusive bird in the course of a short stay.

Peregrine Falcon.

Falco peregrinus peregrinus.—I found the Peregrine in five localities—one inland. There is a price on the head of young and old for no apparent reason. I found the remains of an Arctic Tern at one feeding perch, and on two occasions disturbed another Peregrine from a newly-killed Puffin.

Merlin.

Falco columbarius æsalon.—One pair frequent the Ward Hill, and another pair in the south of the island by their behaviour were

evidently feeding young. I heard from a reliable source of a third regular breeding site.

KESTREL.

Falco tinnunculus tinnunculus.—Not uncommon especially on the east coast of the island.

CORMORANT.

Phalacrocorax carbo carbo.—I have seen this species on Hoy, but do not know if it nests there.

SHAG.

Phalacrocorax aristotelis aristotelis.—A tolerably abundant species. Some nests were perched precariously on the high cliffs at an elevation of 300 feet. Others built on the steep slope a few feet above high-water mark were readily accessible. There is a remarkable local variation in the breeding season. The nests of one small colony all contained eggs or naked young on the 6th July, whilst a few miles along the coast young had quitted the nest. The birds in the first colony might have been rearing their second brood.

SHELD-DUCK.

Tadorna tadorna.—The Sheld-Duck breeds sparingly on the shore at the north end of the island.

MALLARD.

Anas platyrhyncha platyrhyncha.—Found in two or three localities with young.

EIDER.

Somateria mollissima mollissima.—An abundant species. Noted one Duck with young on an inland water $1\frac{1}{2}$ miles from the sea.

RED-BREASTED MERGANSER.

Mergus serrator.—A few seen with young on the burns and lochs.

RED-NECKED PHALAROPE.

Phalaropus lobatus.—I saw Phalaropes at a promising-looking locality on the west side of the island on the 14th July 1931. By the behaviour of one bird I judged that there were young in the vicinity. This locality was all dried up in the summer of 1933.

SNIPE.

Capella gallinago gallinago.—An abundant species, for there is good feeding and good breeding ground.

Redshank.

Tringa totanus totanus.—In fair numbers in suitable localities.

Sandpiper.

Tringa hypoleucos.—A few pairs breed on Sandy Loch in the north of the island, and on the Rackwick Burn.

Curlew.

Numenius arquata arquata.—Sparingly distributed, although there were four pairs in one long valley leading down to Scapa Flow.

Golden Plover.

Pluvialis apricarius apricarius.—Ten pairs were located, widely scattered over the island. This is a surprisingly small breeding population, and there are tracts apparently suitable for breeding purposes, yet untenanted.

Ringed Plover.

Charadrius hiaticula hiaticula.—Only a few pairs breed on the island, for there are few suitable nesting localities. I saw none on inland waters.

Lapwing.

Vanellus vanellus.—An abundant nesting species in cultivated districts. Flocking was noted at Rackwick on 2nd July.

Oystercatcher.

Hæmatopus ostralegus ostralegus.—In a few favoured localities this species is numerous. For instance, on one stretch of beach at the north end of the island barely $\frac{1}{4}$ mile long there were five pairs. A late nest with three eggs was found on 3rd July.

Common Gull.

Larus canus canus.—There is a large, scattered breeding colony in Braebuster, and this Gull also breeds sparingly at other localities, such as Rackwick. The accessible nesting colonies of all the different species of Gull are systematically harried for food, but the birds persist until young are reared. In the summer of 1933, however—perhaps because of the drought—many Gulls (particularly Lesser Black-backed) did not lay again after their early efforts were frustrated—a happy event for other species which they mercilessly persecute.

Herring-Gull.

Larus argentatus argentatus.—In Hoy the Herring-Gull usually nests on the cliffs, and is the least gregarious of the gulls.

Great Black-Backed Gull.

Larus marinus.—This species is fairly common, breeding as a rule in small colonies (often associated with Lesser Black-backed Gulls), although isolated pairs are found on the high hills.

Lesser Black-Backed Gull.

Larus fuscus fuscus.—An abundant summer resident breeding on the cliffs, but more usually in large colonies on the ground. Repeated harrying does not affect the size of the clutch, as nearly all the nests I found in July contained the full complement of three eggs, although the birds had been laying like hens since the first week of May.

Kittiwake.

Rissa tridactyla tridactyla.—This species is very abundant. It does not favour the very high cliffs for breeding purposes, although one nest was observed on a ledge 500 feet above sea-level. This particular nest, situated in absolute security on a broad ledge, was, nevertheless, as carefully constructed and beautifully finished as those whose very safety depended on the perfection of their architecture.

Arctic Tern.

Sterna macrura.—Two large breeding colonies were discovered—one in South Walls, the other in the north of Hoy.

Great Skua.

Stercorarius skua skua.—The Great Skua has bred on Hoy since the Great War. In July 1933 I found over half-a-dozen widely scattered pairs. This Skua is not gregarious on Hoy. Generally very bold in the defence of its young, I was much struck by the conduct of one pair of birds on the 6th July. I pursued, caught, and ringed both the young, yet the old birds showed no concern during the whole performance. I could only conclude that they considered their young—now fully fledged and able to fly a little—well enough able to fend for themselves.

Richardson's Skua.

Stercorarius parasiticus.—There is a large breeding colony—over 25 pairs—in an open valley in the south of the island, and in addition several isolated pairs and small colonies elsewhere. I have seen a Richardson's Skua attack and drive off an intruding Great Skua, and one day I watched one bird pursue a Peregrine for fully five minutes, the Peregrine screaming from time to time as if in fear.

Razorbill.

Alca torda.—Breeds in tens of thousands on the cliffs.

Guillemot.

Uria aalge.—Not so numerous as the last species.

Black Guillemot.

Uria grylle grylle.—An abundant species, apparently capricious in the choice of a nesting site, for long stretches of suitable terrain are untenanted.

Puffin.

Fratercula arctica grabæ. — An abundant species. Near St John's Head Puffins nest in great numbers in the sandy soil at the summit of the cliffs at an elevation of 1000 feet. Here in the first week of July I found young in all stages, and was impressed by the large percentage of addled eggs in the nesting burrows.

Manx Shearwater.

Puffinus puffinus puffinus.—There were certainly three nesting colonies occupied in 1933, all in the north of the island. In each case the colony was situated on a steep rocky slope overgrown with woodrush, and the Shearwaters had burrowed into the matted fibrous roots of the plant, frequently penetrating more than arm's length from the entrance. One of the nesting sites was fully two miles from the sea—a point of interest, for this is essentially a marine species. The occupied burrows contained young in different stages. In some instances the young were not attended by either parent. I was told that the Great Black-backed Gulls kill great numbers of these young Shearwaters when the latter are first brought down to the sea.

Fulmar.

Fulmarus glacialis glacialis.—The Fulmar nests freely on Hoy wherever there are cliffs. A few of the scrapes are accessible from the base of the cliff without the aid of a rope. Most of the young had hatched by the first week of July, though there remained a few incubated eggs. I saw a number of birds—apparently barren—brooding an empty scrape day after day.

Red-Throated Diver.

Colymbus stellatus.—Owing to the sustained drought in the summer of 1933 some of the tarns where the Diver usually nests were completely or partially dried up, and consequently these nesting

sites were unoccupied. After a careful search throughout the island I could locate only six breeding pairs. One nest contained two eggs as late as the 15th July. The number of cases in which the embryo dies within the shell is remarkable, and I never saw both chicks successfully reared.

CORNCRAKE.

Crex crex.—The Corncrake is frequent in the cultivated areas.

MOORHEN.

Gallinula chloropus chloropus.—A rather scarce resident.

ROCK-DOVE.

Columba livia livia.—Nests abundantly on the cliffs.

RED GROUSE.

Lagopus scoticus scoticus.—The Red Grouse breeds sparingly on the island.

NOTE

Feeding of Common Terns.—Whilst golfing on Pollok course recently I have watched with interest several Common Terns fishing in the White Cart which runs down the side of the course. What interested me most was the fact that when they caught a fish they promptly flew off with it in a south-westerly direction. I did not realise before that Terns would nest inland, and as I knew that any sea beach was too far distant, they must be making for an inland water to feed their young. I paid a visit one evening last week to Balgray reservoir and was delighted to see the Terns arriving with fish from the direction of the White Cart.

I actually saw them feeding the young and there seems little doubt that they had nested there in the shingle or sand, of which there is ample owing to the low state of the water. The reservoir itself abounded with fish, judging by those leaping for flies, and the dam above the reservoir was literally swarming with minnows or other small fish, but no attempt was being made to obtain food from these sources. It is probably quite usual for Terns to nest inland, but this is the first occasion on which I have come across them.—IAN HAY, Edinburgh.

"BUTURLIN'S GOOSE" (*ANSER CARNEIROSTRIS*) —ITS POSSIBLE OCCURRENCE IN SCOTLAND.

By JOHN BERRY.

THE occurrence in East Fife (16.x.31 and 5.i.33 respectively) of two unusual Geese intermediate in specific characteristics between the Pink-footed Goose (*Anser brachyrhynchus*) and the Bean Goose (*Anser segetum*), which closely resembled Dr S. A. Buturlin's description of a type from Novaya Zemlya to which he gave the name *Anser carneirostris*, interested me in the possibility of this form's not infrequent appearance in Britain, and the justification for its recognition as at least sub-specifically distinct from Sushkin's goose (*Anser neglectus*) which in many respects it resembles.

As with many classes of animals which seem to evince a relatively recent and rapid evolution, the three or four well-marked types of European Black-nailed Geese are connected by individuals or races of which the characteristics are specifically intermediate, and which are therefore of considerable taxonomic value independently of whether they originate as hybrids, or as atavistic or precursive sports from more dominant main forms. As an example of this, one may take the bills of Bean Geese of the types *arvensis* and *segetum*: the former has a large, heavy bill almost completely yellow, with an arched culmen and almost circular nail (Fig. 1, Nos. 7 and 9), which is in strong contrast to the slender, slightly concave bill of the latter, with its elongated nail, and narrow orange band which does not increase appreciably with age (Fig. 1, No. 8). These two forms are connected by intermediate specimens (especially from England, Sweden, and Finland?) in which the extent and shade of bill-band is variable; approximation to the *arvensis*-type being frequently progressive through life, might suggest the *segetum*-type as pristine, were not such deductions complicated by the occurrence of immature Pink-footed Geese with bills completely pink to the base (Fig. 1, No. 5), one of which in my collection has now started an area of black which is gradually increasing.

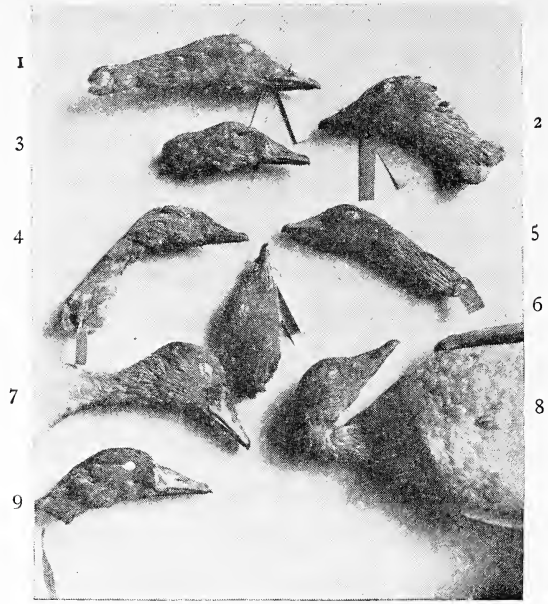

FIG. 1.

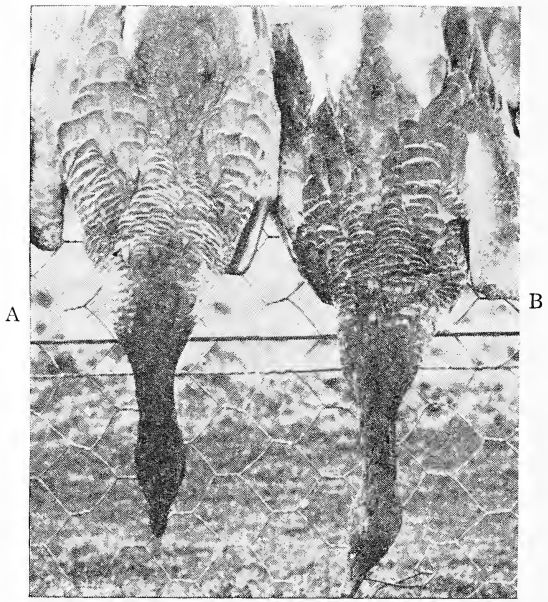

FIG. 2.

EXPLANATION OF FIGURES.

FIG. 1.—"Heads of Black-nailed Geese." (Photographed by kind permission of the Keeper, Natural History Department, Royal Scottish Museum.)

Collector's name in brackets :—

*1. (H. W. Fielden.) Labelled "*Anser segetum*," possibly *A. carneirostris* ? Shot 23.vii.97, at Belootcha Bay, Novaya Zemlya. Culmen, 50 mm. ; depth, 22 mm. ; nail, 16 mm. ; teeth, 23/23.

*2. (H. W. Fielden.) Labelled "*Anser segetum*," but also with a note : "Typical specimen of '*Carneirostris*' (Buturlin)." Shot 20.vii.95, at Neckwatowa, Novaya Zemlya. Culmen, 46 mm. ; depth, 21 mm. ; nail, 15 mm. ; teeth, 21/21.

3. (J. Berry.) ?? *Anser carneirostris*. (Immature female, 1st year.) Shot 5.i.33, near Leuchars, East Fife. Culmen, 47 mm. ; depth, 22 mm. ; nail, 13 mm. ; teeth, 23/23. (My previous specimen—an immature male —had : Culmen, 50 mm. ; depth, 22 mm. ; nail, 13·5 mm. ; teeth, 23/23.)

4. (J. Berry.) *A. brachyrhynchus*. (The most slender bill I have ever seen for this species.) Caught in East Fife, and died soon after of tuberculosis. Culmen, 41 mm. ; depth, 20 mm. ; nail, 13 mm. ; teeth, 21/21.

5. (J. Berry.) *A. brachyrhynchus*. (Bill entirely pink except for the nail, and a line on the lower jaw.) Shot 7.iv.32, in East Fife. Culmen, 42 mm. ; depth, 22 mm. ; nail, 13 mm. ; teeth, 21/22.

6. (H. W. Fielden.) *A. brachyrhynchus*. (Typical.) Shot in Norfolk, Culmen, 43 mm. ; depth, 22 mm. ; nail, 13 mm. ; teeth, 21/22.

7. (F. W. Smalley.) *A. arvensis*. (Immature male.) Shot 25.ix.13, Great Yarmouth, England. Culmen, 63 mm. ; depth, 25 mm. ; nail, 16 mm. ; teeth, 24/24.

8. (F. W. Smalley.) *A. segetum*. (Typical adult.) Shot 4.xi.07, Great Yarmouth, England. Culmen, 56 mm. ; depth, 23 mm. ; nail, 20 mm. ; teeth, 25/26.

9. (Collector unknown.) *A. arvensis*. (Nail almost all white.) Shot 10.i.13. Fair Isle. Culmen, 63 mm. ; depth, 24 mm. ; nail, 14 mm. ; teeth, 28/30.

FIG. 2.

A. Typical Pink-footed Goose (*A. brachyrhynchus*). Fife, 5.i.33.

B ?? Buturlin's Goose (*A. carneirostris*). Fife, 5.i.33.

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* Since the above was written these two heads have been examined by Dr Schenk of Budapest. He is of opinion that they are the *segetum* type, and not *carneirostris*, which in view of their dimensions is a decision of very considerable taxonomic importance.

It is possible that the so-called *Anser carneirostris* of Dr Buturlin may be some such missing link between the Pink-billed and -legged Sushkin's Goose (*A. neglectus*), and the Yellow-, or Orange-billed and -legged Bean Geese. Dr Schenk, of Budapest, informs me that in plumage *A. neglectus* and *A. carneirostris* are almost indistinguishable, noticeable differences being that the latter has orange-yellow legs, and is in general rather smaller than the former, which in size much resembles the Bean Goose (*A. segetum*).

Unfortunately, very little is known about the distribution of Buturlin's Goose, apart from the discovery of its nesting ground in Novaya Zemlya, and its somewhat sporadic occurrences in Hungary where it has been obtained so plentifully at times, that it is difficult to consider it as a possible hybrid, analogous to those so well known in central Scotland between the Carrion and Grey Crows (*Corvus corone* and *Corvus cornix*).

The two unusual Geese obtained in East Fife closely resembled a Bean Goose (*A. segetum*) in shape and plumage, a semblance which was greatly increased by the striking orange-yellow colouration of their legs, a shade quite unlike the yellowish tinge occasionally noticeable in Pink-footed Geese; but although their dark brown, almost black plumage —particularly of rump and wing-coverts—bore no likeness to that of *A. brachyrhynchus* (Fig. 2), they were far nearer to that species than to *A. segetum* in size, and also in length of bill.

The Natural History Museum, London, appears to have no skins of *Anser carneirostris* with which I could compare my example, but the Royal Scottish Museum, Edinburgh, has two most interesting heads of geese shot in Novaya Zemlya, which possibly might be referable to this species (Fig. 1, Nos. 1 and 2). They are labelled "*Anser segetum*," but a collector's note attached to the smaller head reads: "Typical '*Anser carneirostris*' of Buturlin"; the general shape and form of these bills certainly are like those of *A. segetum*, but they are so short that they might well have passed for those of *A. brachyrhynchus* had they not been obtained in Novaya Zemlya where the occurrence of Pink-footed Geese is remotely improbable.

In his excellent paper on *A. neglectus* and *A. carneirostris* in *Aquila* for 1929-30, Dr James Schenk gives a coloured plate of the latter, but the reproduction is not very good, and it is of little value as an aid to identification. Strangely enough the best illustration of this species which I have yet seen is a plate of "The Bean Goose," in *The Birds of Europe*, vol. v., by Dr John Gould, F.R.S., published in 1837. Being individually hand painted, the colours of these plates vary slightly in different copies, but the text description might also apply to *Anser carneirostris*. "The whole bill," he wrote, "is black, with the exception of a band of pinky-yellow, sometimes inclining to red, which surrounds both mandibles near the point; . . . legs and webs orange." It is regrettable that there is no note of the origin of the specimen from which this plate was drawn, and it must be borne in mind that the Pink-footed and the Bean Geese were at that date still confused, so that this note was very probably designed to cover both species. At the same time, his account of the other geese in that volume is as accurate as in his later work on *The Birds of Great Britain*, in which both Pink-footed and Bean Geese are admirably illustrated and described; so that no mention of his Pink-billed "Bean" Goose, occasionally having pink legs instead of orange, is somewhat remarkable.

It is interesting to note that my second doubtful specimen from Fife had considerable white feathering at the base of the bill (Fig. 1, No. 3), although dissection showed it to be an immature female, probably in its first year; this may be paralleled in the Yellow-billed Goose (*A. arvensis*), for a young female in my collection which used to have a broad white "front" has recently lost it, although development of this basal white feathering in the White-nailed Geese seems usually to increase, rather than diminish, with age.

I sincerely hope that in future a keen look-out may be kept for unusual geese, and that any doubtful specimens may be sent at once to a competent authority for examination; the form "*Anser carneirostris*" may not be by any means so scarce as is supposed, but it might easily be overlooked, as was, for so many years, the now well-known "*Anser brachyrhynchus*."

Breeding of the Eider Duck in Midlothian.—For several years past the Eider Duck has been extending its range up the Firth of Forth. At the mouth of the Esk at Musselburgh, a place which I have had under observation for a long number of years, this duck was not observed till 1929, and since then it has been seen very frequently. It has been observed several times at Seafield and also on the water off Leith Pier. A few records of this bird, still further up the Forth, have been made. During early June of the present year, when sailing past Inchmickery with other ornithologists, an Eider Duck was observed sitting on a rocky part of the island. Going ashore we found it to be sitting on four eggs. The late Mr William Evans is said to have had a note with reference to this duck as follows—

> "*8th October* 1886, T. Hope, birdstuffer, tells me he knew a man who used to take Eiders' eggs on Inchmickery twenty or thirty years ago."

Whether this record was authentic or not, at that time the Eider must have been a comparatively scarce species, and it seems rather strange that so many years have elapsed without further records. Mr Evans could not have considered it of much importance, as in the list of the "Birds of the Forth Area" which appeared in the Scottish Naturalist Jan.-Feb. 1928, the Eider Duck is only given as a visitor to Midlothian. It is therefore interesting to record the present instance which definitely settles the fact of the Eider breeding in MidLothian.—D. Hamilton, Edinburgh.

Pied Flycatcher nesting in Lanarkshire.—I have a number of Selborne Society nesting boxes in my grounds in the neighbourhood of Biggar which are mostly used by the Tit family. In one of them, however, this year a pair of Pied Flycatchers has reared a brood of seven. I hope they may return another year.—E. L. Dunlop.

Unusually large clutches of Oystercatcher's and Curlew's Eggs.—Although birds seem very faithful to their normal number of eggs in each clutch, yet from time to time an unusually large number seem to be laid. This year I was fortunate enough to find an Oystercatcher's nest with four eggs and a Curlew's with five. The Oystercatcher's nest was within 4 yards of a main road, and everyone, walking, or in a car, passed it. The bird really looked silly sitting there so near the highroad, but, in spite of this, all four eggs hatched out and she got her young away safely.—E. J. Ferguson (Lt.-Commander) Baledmund, Pitlochry.

NOTES ON PARASITES OF *ABRAXAS GROSSULARIATA* IN FIFE.

By Dorothy J. Jackson.

In June last year my attention was drawn to the ravages of caterpillars on a bush of *Euonymus japonicus* in a garden at St Andrews. The caterpillars were those of the Magpie Moth, *Abraxas grossulariata* L. Other gardens which I visited in and around St Andrews were found to be almost or entirely free from this pest, but in a cottage garden at Strathkinness the gooseberry bushes were severely damaged by it. Here on the 15th June the majority of the caterpillars had pupated and the pupæ were abundant on the bushes. Wishing to investigate the parasites of this insect, I collected the pupæ and such larvæ as were available, obtaining most of my material from Strathkinness on the 15th and 23rd June.

The parasitism amongst the late caterpillars was heavy, mostly by the larvæ of the Tachinid fly, *Phryxe nemea* Mg., a well-known parasite of *A. grossulariata.* The flies, when reared, were submitted to Mr Colbran J. Wainwright who has kindly named them for me. The caterpillars containing the Tachinid larvæ can sometimes be recognised in the final stages of parasitism, as the posterior two-thirds of the body may become swollen, leaving only the head and anterior segments capable of movement. Other parasitised caterpillars appear normal even to the stage of spinning the foundations of their flimsy cocoons. Eventually the affected caterpillars become limp and fall to the ground, unless entangled and suspended on the bushes by their silken threads. Two or three days later the maggots emerge from the caterpillar by making an irregular slit in the ventral body wall. The number of maggots present in the host varies; one caterpillar dissected contained seven larvæ of various sizes, another only three, but only one, or more rarely two larvæ (in a single instance three) emerged from each host. When provided with soil, the larvæ which issued buried themselves in it and there transformed into brownish red puparia. From these the flies emerged from twelve to fifteen days later, the first appearing on 7th July.

The caterpillars were also parasitised by Braconid larvæ. On 22nd June a caterpillar, found lying down but still living, was chloroformed and dissected. One large and three small Tachinid larvæ, all alive, occurred within it, also a number of Braconid larvæ having the conspicuous anal vesicle well known in larvæ of *Apanteles* and *Microgaster*. The Braconid larvæ were all apparently dead and several were partially disintegrated, so, but for my interference, in all probability one or more of the Tachinid larvæ would have emerged as the successful parasites. On 6th July a caterpillar was observed to have the hinder part of its body surrounded by a festoon of 21 cocoons of a greenish white colour, and 5 additional cocoons, doubtless from the same caterpillar, were found near by. The imagines, Braconids, began to emerge from the cocoons on 10th July. I am indebted to Dr Charles Ferrière for their determination as *Apanteles limbatus* Marsh.

The parasitism amongst the pupæ of *Abraxas grossulariata* was also high. The pupæ collected numbered 231. They were kept in glass cylinders, the ends of which were covered with muslin. The moths began to emerge from 20th June until 9th July, the majority in the end of June. Most of the parasites appeared later. The pupæ containing parasites could be recognised in certain stages of parasitism by the immobility of the abdominal segments, and the yellow bands on the abdomen were of a dingier colour than in healthy pupæ.* One such pupa, dissected on 24th June, was

* In breeding *Pimpla examinator* on pupæ of *Pieris rapæ* it has been found that the pupæ become immobile from 20 hours to 2 days after oviposition by the parasite, and they do not move again. With *Stenichneumon trilineatus*, bred this year on pupæ of *A. grossulariata*, the immobility is much less complete and pupæ have been found still capable of feeble movement up to 10 days after oviposition. After some days of immobility, the abdomen is again jerked actively from side to side when the pupa is touched, but the movement is now made entirely by the full-grown larva or pupa of the parasite. The change in colour of the yellow abdominal bands of the pupa of *A. grossulariata* during parasitism is due to the fact that these bands are transparent strips of cuticle through which the yellow body contents show. As the pale coloured larva develops, the yellow fat body disappears and the colour of the bands changes from pale yellow to greyish ochreous. Finally, when the larva voids the yellow contents of its gut, the rings on the posterior segments of the host assume an orange-yellow colour owing to the presence of the excrement, which can be seen clearly through the transparent bands.

found to be filled by a large parasite larva, already in the pronymphal state. The larva was orientated in the same way as its host, and so closely did it fit into the pupa that the integument of the latter had to be removed with the greatest care to avoid injuring the parasite. Subsequently it was possible to identify this larva as that of *Stenichneumon trilineatus* Gmel., a species which proved to be the most common parasite of the pupæ of *Abraxas grossulariata.* This Ichneumon emerges by removing a neat circular cap from the anterior end of the pupa. Sometimes the incision does not go completely round and the cap remains in position like a half-opened lid, and in any case the silken threads which support the pupa usually prevent the "cap" from falling out of place. If the cap drops off it appears as though the head end of the pupa had been sliced off, so straight is the cut edge. Altogether 15 males and 22 females of *S. trilineatus* emerged, between 4th and 21st July, most of the males appearing from 4th to 8th July and the majority of the females a few days later. It is interesting to find that Cuthbertson (1927) records a 25 per cent. parasitism by this species of *Abraxas grossulariata* infesting black currant and gooseberry bushes near Glasgow in 1925. Despite the importance of this insect as a parasite of a troublesome pest I have been unable to discover any account of its bionomics, apart from the brief notes given by Morley (1903). I am at present investigating its habits and life-history and would be grateful for any information regarding its parasitism on other Lepidopterous pupæ.

On 10th July the first individual of another parasite, a female of *Pimpla examinator* F., emerged from one of the *Abraxas* pupæ. It was followed by 25 females and one male, the majority emerging in the middle of July, the last on 22nd July. A female pupa of this species was also obtained on 13th July by dissecting an *Abraxas* pupa. The emergence hole made by *P. examinator* occurs in the anterior end of the pupa; but it is readily distinguishable from that of *Stenichneumon trilineatus* as no cap is formed, the pupal integument being broken off in small fragments, the hole thus made being smaller and of irregular shape. This

species, and also the *Stenichneumon*, have been identified by Mr G. J. Kerrich, for whose kind assistance I am most grateful. *P. examinator* has been recorded from a great number of Lepidopterous pupæ, and Voukassovitch (1924) records it also as a parasite of caterpillars of *Hyponomeuta sp.* A certain amount is known of its life-history and early stages, Meyer (1925), Thorpe (1930), and Voukassovitch (1927) having written on this species. I have been breeding it successfully on *Pieris napi*, *P. rapæ*, *Synopsia abruptaria* Thunb., *Pseudopanthera petraria* Hübn., *Deilinia pusaria* Linn., and *Cepphis advenaria* Hübn., species which occur in the pupal state during the winter, while *Abraxas grossulariata*, hibernating as a young larva, is not available.

A third Hymenopteron has been obtained from the *Abraxas* pupæ; this is a Pteromalid, *Habrocytus moerens* Walker, identified by Dr Ferrière, who informs me that nothing is known of the biology of this species. Seven females and two males were reared from 17th to 27th July, each emerging from a different pupa by a minute hole on the side of one of the abdominal segments. Dissection has shown this species to be a hyperparasite of the *Abraxas* pupa, its host being a large Hymenopterous larva. After the emergence of the Pteromalid, this larva may be found limp and dead, filling up the *Abraxas* pupa. It is many times larger than the minute insect which had encompassed its death. By comparing this larva with the last larval exuviæ present in *Abraxas* pupæ from which *Stenichneumon trilineatus* had emerged, it was evident that the *Habrocytus* had developed on a larva exactly resembling that of *S. trilineatus*. This has been established in five instances; the *Habrocytus* may also parasitise *Pimpla examinator*, but of this I have as yet no evidence, and the larvæ of these two Ichneumons are easily distinguishable.

There remained, after the above insects had been bred, 36 pupæ of *A. grossulariata* from which neither moths nor parasites emerged. They were kept until May this year when, smelling offensively, they were boiled in caustic potash and dissected. Ten were found to contain Ichneumon larvæ or pupæ. Of these seven are assignable to *S. trilineatus* and

two to *P. examinator*, while one larva, in an immature instar, remains as yet unidentified.

The percentage of parasitism amongst the pupæ of *A. grossulariata* was thus 36·79. Assuming that the Pteromalid was in all cases a parasite of *Stenichneumon trilineatus*, the latter species would have occasioned a parasitism of 23·37 per cent.

REFERENCES.

CUTHBERTSON, A., 1927, "Note on an Ichneumon (*Stenichneumon trilineatus* Grav.), parasite of the Magpie-moth (*Abraxas grossulariata* Steph.)," *Scot. Nat.*, No. 163, p. 24.

MEYER, N. F., 1925, "Zur Biologie und Morphologie von *Pimpla examinator* Fabr. (Hymenoptera, Ichneumonidæ)," *Zeitschr. f. angew. Ent.*, ii., pp. 203-212.

MORLEY, CLAUDE, 1903-1908, *The Ichneumons of Great Britain*, i., pp. 44-45; iii., pp. 98-99.

THORPE, W. H., 1930, "Observations on the Parasites of the Pine-shoot Moth, *Rhyacionia buoliana* Schiff.," *Bull. Ent. Research*, xxi., Part III., pp. 387-412.

VOUKASSOVITCH, P., 1924, "Contribution à l'étude de l'Eudémis (*Polychrosis botrana* Schiff.), de la Pyrale de la Vigne (*Œnophthira pilleriana* Schiff.) et de leurs parasites," *Thèse Doct. Univers.*, Toulouse.

Bird Notes from the Outer Hebrides.—When in the woods at Stornoway on 5th April 1934, I heard a Blackbird scolding loudly, and on approaching cautiously found a Tawny Owl sitting in one of the trees. I watched it for some time and got an excellent view of it. In May 1932 we thought we heard a Tawny Owl hooting in these woods but it was very far away and we could not be quite sure. There seems to be no previous record of this species in the Outer Hebrides.

On Bernera, to the west of Lewis, I was told that grouse come over from Lewis about 20th August, after the shooting has begun, and are more plentiful on Bernera after that time. This struck me as interesting, in view of the idea that the Hebridean Grouse is so sedentary. At Balelone, on the W. side of North Uist, Corn Buntings were very plentiful: I counted 80 in the bushes round the house. Here too were great flocks of Golden Plover on the machar: I got quite near some of the flocks and all I could examine closely were the Northern Golden Plover, the finest plumaged bird I have ever seen.

Buzzards are now not uncommon about Tarbert, Harris, and breed regularly there. Dr Ross, to whom I am indebted for this information, says that a few years ago there was none there.

At Mallaig on 14th April was a glaucous Gull in the cream plumage.—Evelyn V. Baxter.

The Smooth Hound (*Mustelus lævis*).—In the second week of June a fine specimen of this species of Dog Fish was taken in Mr Adam Birrell's salmon nets in the estuary. When landed, it gave birth to eleven live young, each thirteen inches long. It is interesting to note that Couch in his work on British fishes, remarks that the Smooth Dog "seems to be less prolific than the generality of Sharks. In the month of November I have found it with eleven young ones just ready for exclusion, and all of one size."

Couch states that the Smooth Dog grows to about three feet in length; but that taken in Mr Birrell's net measured 6 feet 9 inches. —Herbert Maxwell, Monreith.

BOOK NOTICES

A Bibliography of Gilbert White, the Naturalist and Antiquarian of Selborne. By Edward A. Martin, F.G.S., London: Halton & Co., Ltd., 1934, demy 8vo, 188 + viii pages (exclusive of Index) and 18 illustrations. Price 10s. 6d. This is an enlarged and revised edition of a work published over thirty years ago, and now out of print. A good many additional facts have been gleaned concerning the life of the great Selborne naturalist, whose letters form one of our greatest English classics, and are read by civilised peoples in all parts of the world. The present edition contains five introductory chapters which are very pleasant reading; the remainder of the volume is devoted to the Bibliography proper, in which the various editions are arranged alphabetically under the names of the various editors. This is a useful and satisfactory arrangement, and the list is probably not far from complete. The book is artistically printed and neatly bound, and the illustrations excellent. We have noticed two misprints: on p. 31, line 12, for *Bitish* read *British;* and on p. 78, line 22, for *National* read *Natural.*

Plant Chimaeras and Graft Hybrids. By W. Neilson Jones. London: Methuen & Co. Ltd., 1934, 136 pages and 21 illustrations. Price 3s. 6d. net. This is one of the most recent additions to the valuable series of little handbooks entitled "Monographs on Biological Subjects." The material making up this work has been founded upon a course of lectures delivered to advanced students of botany in the University of London. The book will not only interest the scientific worker, however, but also the practical gardener. Many of the plants alluded to in the text are familiar to horticulturists, and no doubt a good many persons who have tried experiments in hybridisation and grafting will be interested in the scientific interpretations given in this volume. The illustrations are clear and helpful, and the book is beautifully printed.

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Profile of an old peat-cutting, showing zonation of peat. Depth about 4 feet. On the right beyond the ditch partial regeneration with *Scirpus*, *Eriophorum*, *Erica Tetralix*. On top of the peat is a close growth of *Erica*. [*Photo by E. Philip Smith.*

(*Authors are responsible for nomenclature used.*)

The Scottish Naturalist

No. 210] 1934 [November-December

THE NATURAL HISTORY OF SOUTH RONA.

THE RESULTS OF A BIOLOGICAL EXPEDITION FROM UNIVERSITY COLLEGE (UNIVERSITY OF ST ANDREWS), DUNDEE, JULY 1933.

Edited by Professor A. D. PEACOCK, Dr EDITH PHILIP SMITH, and C. F. DAVIDSON, B.Sc.

(*Continued from p.* 127.)

III. THE VEGETATION OF SOUTH RONA.

By EDITH PHILIP SMITH.

THE island of Rona lies between Skye and the mainland. It is about $4\frac{1}{4}$ miles long by $1\frac{1}{4}$ miles wide at the widest part. The highest point on the island is Meall Acairseid (404 feet). The island lies to the north of Raasay, separated from it by Caol Rona (Kyle Rona), a turbulent stretch of water $1\frac{1}{2}$ miles wide.

The island is composed of worn Lewisian gneiss, and the general aspect is rocky and barren. The general configuration is a series of rocky ridges and furrows, running mainly in a north-west, south-east direction. There are no streams of any importance on the island, and only two bodies of water (see below, also Fig. 3).

The soil is poor and mainly acid. The *p*H values for each type of habitat (obtained by using the British Drug Houses Soil Indicator Apparatus) are given below under each heading.

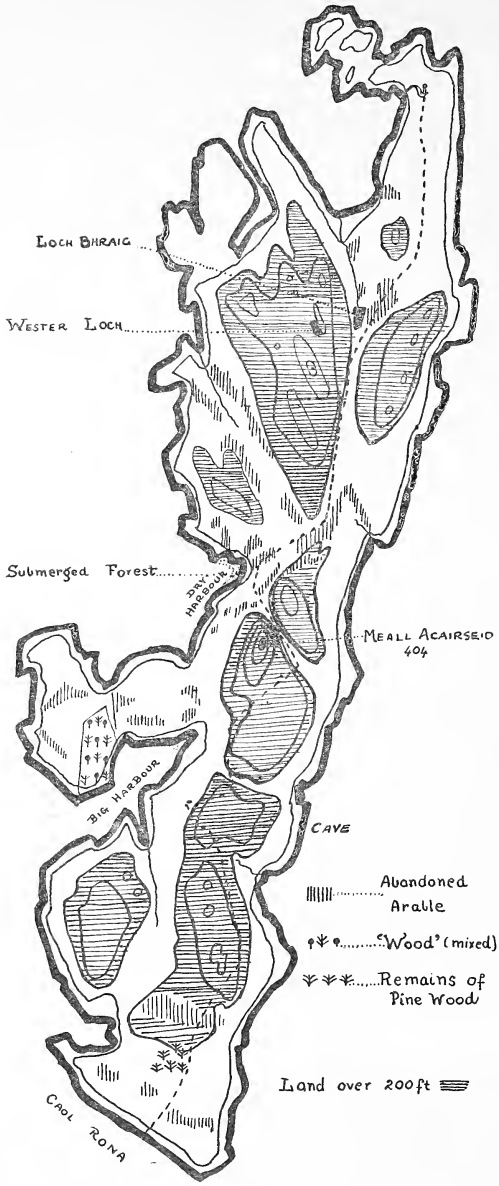


FIG. 3.—SOUTH RONA: scale approximately 1·25 inches to 1 mile.

Reproduced from the Ordnance Survey Map, with the sanction of the Controller of H.M. Stationery Office. Printed by Oliver and Boyd, Tweeddale Court, Edinburgh 1.

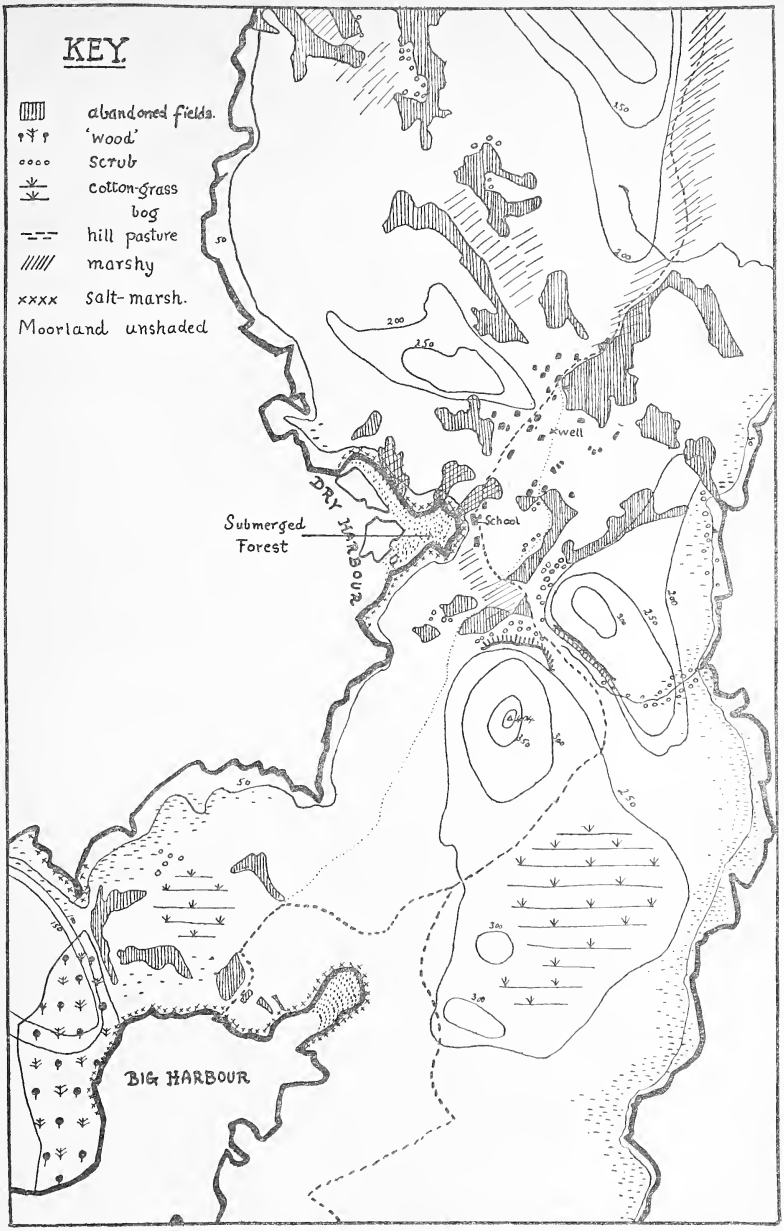


FIG. 4.—Central Part of Island of South Rona: scale approximately 3·5 inches to 1 mile. Outline of fields and path from 6-inch Ordnance Map. Contours added from 1-inch Ordnance Map.

Reproduced from the Ordnance Survey Map, with the sanction of the Controller of H.M. Stationery Office. Printed by Oliver and Boyd, Tweeddale Court, Edinburgh 1.

There is one path on the island, running from Caol Rona in the south to the lighthouse in the north, and touching Big Harbour and Dry Harbour (see Map, Fig. 4). It is now impassable for a wheeled vehicle, and sufficiently rough even for the foot-passenger.

On an island as small as this, grazed by sheep and cattle, and formerly supporting a population of 159 (1883), the influence of man penetrates almost everywhere. It is possible, however, to distinguish types of vegetation as natural, and others as affected by human agency:—

A. NATURAL VEGETATION.

(1) Salt marsh
(2) Lowland marsh
(3) Upland marsh
(4) Moor
(5) Peat-bog
(6) Hill pasture
(7) Cave
(8) Fresh-water aquatic
(9) Thalassiophyta
(10) Woodland
(11) Rock community.

B. VEGETATION AFFECTED BY HUMAN AGENCY.

(1) Planted wood
(2) Arable
(3) Roof-top vegetation
(4) Peat cuttings
(5) "Sea-weed Farm"
(6) Various.

The names used are those given in Bentham and Hooker's *British Flora*, 7th edition, 1930.

GENERAL.—Rona, like many another Hebridean island, has been abandoned by its population, but unlike St Kilda, where the cessation of cultivation was abrupt, the tilled ground on Rona has only gradually fallen out of use. Consequently the reversion to natural conditions has reached a later stage than in St Kilda, and at first sight nothing but the ruined crofts and the nettles round their doors remain to tell of human occupancy.

The 6-inch Ordnance Survey map shows the cultivated land as it existed about forty years ago. There were then about 133 acres under cultivation in oats and potatoes: an isolated gooseberry bush and a few stalks of rhubarb beside a croft show the extent of the horticultural efforts. The three crofters at present living on the island are content

with a small patch of potatoes and a few heads of rhubarb: they get their meal and flour from the mainland.

The general configuration of the island, as stated above, shows a series of depressions in the general rocky mass, running for the most part north-west and south-east. The north end of the island is less rocky than the south end. The eastern margin of the island drops sharply away in cliffs, broken by steep gullies where a stream comes down. On the western side are two anchorages—Big Harbour (usable at any state of the tide) and Dry Harbour (usable only at high tide). The schoolhouse was at Dry Harbour. Round these inlets, and at other points where the land slopes more gently to the sea, there is developed a small amount of salt marsh (Plate VII, *B*).

The bottoms of the valleys are very wet, and even in the exceptionally dry summer of 1933 their marshy character was obvious.

A. NATURAL VEGETATION.

(1) Salt Marsh (*p*H 7·25—6·75).

The following plants were found in the salt marsh:—

Arenaria serpyllifolia
Armeria maritima
Aster Tripolium
Atriplex patula (succulence very variable)
Cochlearia officinalis (at upper margin of marsh)
Glaux maritima
Plantago maritima
Sagina maritima
Sagina procumbens
Salicornia herbacea (nearest sea)
Triglochin maritimum
Triglochin palustre.

At the upper margin were found:—

Juncus articulatus
Juncus acutiflorus
Juncus squarrosus
Iris Pseudacorus
Oenanthe crocata
Agrostis palustris
Triodia decumbens.

(2) Lowland Marsh (*p*H 6·25—5·75). (Plate VIII.)

Plants found:—

Agrostis palustris
Aira flexuosa
Arenaria serpyllifolia
Achillea Ptarmica
Bellis perennis
Caltha palustris
Carduus arvensis
Cynosurus cristatus
Drosera rotundifolia
Euphrasia officinalis

Epilobium palustre
Festuca ovina, var. *vivipara*
Galium saxatile
Hydrocotyle sp.
Holcus lanatus
Iris Pseudacorus
Juncus acutiflorus
J. articulatus
J. communis
J. lamprocarpus
Lolium perenne
Lychnis flos-cuculi
Myosotis sp.
Narthecium ossifragum
Pedicularis sylvatica
Prunella vulgaris
Potentilla Anserina (towards drier margins)
Ranunculus acris
R. auricomus
Rhinanthus Crista-galli
Rumex Acetosa
R. Acetosella
Salix repens
Senecio aquaticus
Spiræa Ulmaria
Stellaria media
Trifolium pratense
T. repens
Triodia decumbens
Veronica scutellata.

(3) Upland Marsh (*p*H 5·75—5·0).

This is found in the upland, undrained valleys, is characterised by the greater proportion of moorland plants, but grades into the lowland marsh where they meet.

Plants found :—

Agrostis palustris
Aira flexuosa
Arundo Phragmites
Calluna vulgaris
Carex spp.
Cynosurus cristatus
Drosera rotundifolia
Erica cinerea
Erica Tetralix
Eriophorum vaginatum
Epilobium palustre
Habenaria bifolia
Holcus lanatus
Juncus communis
Juncus lamprocarpus
Molinia cærulea
Myrica Gale
Myosotis palustris
Narthecium ossifragum
Orchis latifolia
Pedicularis sylvatica
Polygala vulgaris
Potamogeton natans
Potentilla erecta
Prunella vulgaris
Ranunculus Flammula
Rhinanthus Crista-galli
Rhinchospora alba
Salix repens
Senecio aquaticus
Schœnus nigricans
Scirpus cæspitosus
Sphagnum spp.

(4) Moor.

The principal elevations of the island (above 200 feet) are covered with moor, *Calluna* being dominant. On the cliff-tops, especially on the east side of the island, this moor-

land grades into hill-pasture, which is quite closely cropped by sheep. It also passes over into peat-bog where the soil is deeper and the drainage poor. A large area of peat exists on the south-east flank of Meall Acairseid (404 feet in height), and on the north side of Big Harbour, and also towards the south end of the island. These will be described below.

The heather nowhere reaches any great height, and on the bare hill-tops is very short and wiry. The top of Meall Acairseid may be taken as typical of this kind of vegetation. The hill-top is rounded, with outcrops of worn Lewisian gneiss. Growing actually on the rocks were *Sedum anglicum*, *Plantago maritima*, *Plantago Coronopus*. The vegetation on the flat stretches between the rocks showed the following (analysis of a 6-foot quadrate, lying north-south):—

Calluna vulgaris—dominant
Empetrum nigrum—subdominant
Potentilla erecta—abundant
Erica cinerea—abundant
Galium saxatile
Molinia cœrulea
Agrostis sp.
Juniperus communis (one plant, very dwarf)
Viola sp. (leaves only).

In a sheltered crack between the rocks were found *Polygala vulgaris*, *Hypochœris glabra*, *Blechnum Spicant*: scattered patches of *Vaccinium Vitis-idæa* were also found.

A patch of burnt ground showed the following regeneration:—

Calluna vulgaris	250 plants
Potentilla erecta	54 ,,
Molinia	22 ,,
Agrostis	20 ,,
Pteris aquilina	9 ,,
Carex	4 ,,
	359 ,,

An analysis was made of the vegetation on a line of Tertiary intrusion.

(i) On dry ground:—

Scirpus cæspitosus—co-dominant
Erica Tetralix
Calluna vulgaris—abundant
Molinia cœrulea—frequent
Potentilla erecta—occasional.

(ii) On wet ground:—

Rhinchospora alba—dominant
Molinia cærulea—frequent
Schœnus nigricans—frequent
Narthecium ossifragum—frequent
Scirpus cæspitosus—occasional
Erica Tetralix—occasional
Myrica Gale—occasional
Eriophorum vaginatum — occasional
Drosera longifolia—occasional
Drosera rotundifolia—rare.

(5) Peat-bog.

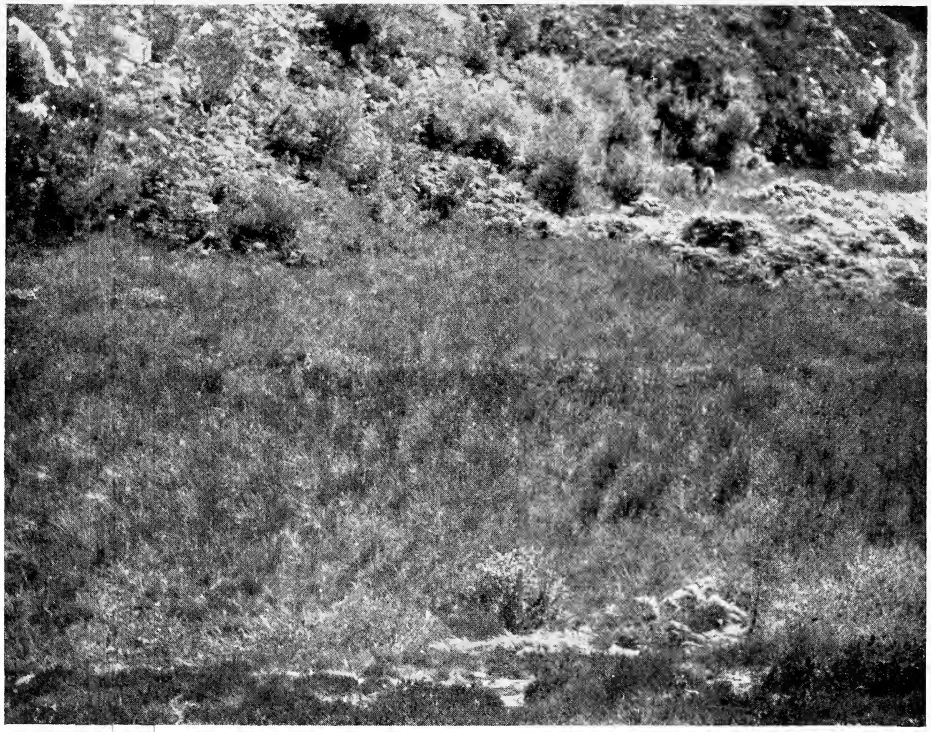
There did not appear to be any great depth of peat on the island: 3·5 to 4 feet was the greatest depth exposed in a cutting. A cutting towards the south end of the island showed the following stratification (see Plate IV):—

15	inch	black
6	„	pale reddish
15	„	deep brown-red
12	„	black (sodden)
48	„	

There was evidence at various points on the island that peat had at one time been extensively cut. Now only two areas were in use. The peats were cut about 12″ × 8″ × 3″ and stacked in small heaps. The margins of the cuttings abutted on typical cotton-grass moor, with *Eriophorum vaginatum* dominant. The "floor" of the cutting showed interesting regeneration. *Eriophorum vaginatum* and *Scirpus cæspitosus* were co-dominant at this stage, and were growing in beautifully isolated clumps, with occasional plants of *Schœnus nigricans* and *Rhinchospora alba* interspersed. In the drier parts were *Juncus articulatus*, *Erica Tetralix*, *Pedicularis*: in the wetter, *Sphagnum* with *Drosera*, *Pinguicula*, *Narthecium* and *Myrica Gale*. The *p*H of the peat-bog was about 3·75.

(6) Hill Pasture.

The close-cropped turf extended to the cliff-edge on both sides of the island, often mixed with a good proportion of heather. On the east side, the cliffs are mostly high enough to be out of the reach of salt spray. On the west side they are lower and in some parts wanting. No special alterations in the vegetation in response to spray could be detected.



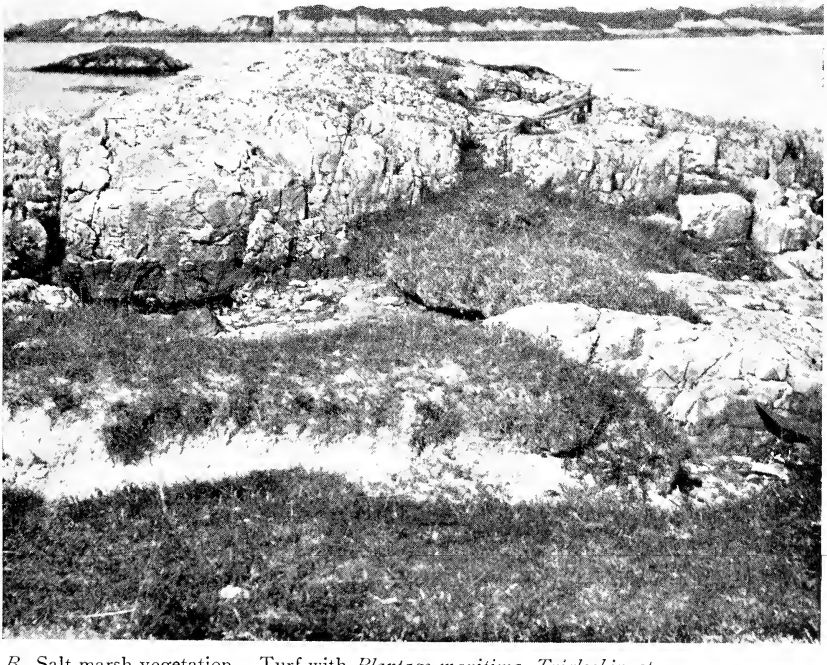
One of the abandoned fields. Lying in a hollow, running N.-S. Note indication of old field drain in middle of field. A practically pure society of *Juncus communis* with a few wet-meadow plants near drain. Note scrub birch and bracken on opposite slope of ridge.

[*Photo by E. Philip Smith.*

Rocks at Big Harbour showing *Laminaria* zone partially uncovered. Above is *Pelvetia* and *Fucus serratus*.

[*Photo by E. Philip Smith.*

A. Planted wood at Big Harbour from the shore. Note untended trees, bent over by prevailing winds. Upper edge of salt-marsh in foreground, with *Juncus*. *Iris*.



B. Salt-marsh vegetation. Turf with *Plantago maritima*, *Triglochin*, etc.

[*Photos by E. Philip Smith.*

Upper end of marsh (an abandoned field) stretching inland from Dry Harbour. It merges into grassy sward and then into moory patches with rocks showing through. Two of the deserted crofts are seen, the one in the centre retaining its thatched roof.

[*Photo by E. Philip Smith.*

The analysis of a typical quadrate of the turf was as follows:—

Calluna vulgaris	100 plants
Ranunculus acris	86 ,,
Euphrasia officinalis	63 ,,
Plantago lanceolata	60 ,,
Rhinanthus Crista-galli	38 ,,
Molinia cœrulea	25 ,,
Achillea Millefolium	22 ,,
Poa sp.	18 ,,
Arenaria serpyllifolia	15 ,,
Centaurea nigra	13 ,,
Triodia decumbens	10 ,,
Trifolium repens	5 ,,
Prunella vulgaris	4 ,,
Bellis perennis	3 ,,
Cerastium vulgatum	3 ,,
Lolium perenne	2 ,,
Lotus corniculatus	1 ,,
Hypochœris radicata	1 ,,
Rumex Acetosella	1 ,,
	470 ,,

A rocky spur projecting into Dry Harbour was covered with moorland vegetation, with bracken and *Vaccinium Myrtillus*. In a crack which ended in a sea-shingle lane were *Matricaria maritima* (succulent) and the Common Dock (only slightly succulent) growing practically in the shingle.

On the eastern side, due east from Meall Acairseid, the cliff-top had been burnt. It was regenerating with seedling *Calluna* and abundant bracken.

Over certain reaches on the west side *Daucus Carota* was common in the turf near the sea margin, and *Sedum Rhodiola* was found on the rocks.

(7) Vegetation of the Cave.

There is a large cave in the cliffs on the eastern side of the island. The mouth of the cave is about 85 feet above sea-level, and the cliff drops sheer to a great depth of water. The cave is roughly triangular in plan, sloping up to the back, where the roof descends and meets the floor. The

floor is covered with a mixture of shell-gravel and peat, well trampled, because this cave was in use as a place of worship at the time of the Disruption. The flora is very scanty. At the mouth, a brake of *Pteris*, with some large plants of *Athyrium filix-fœmina* and *Aspidium spinulosum* screens the opening. Behind that is a huge growth of nettles, somewhat etiolated, with *Galium Aparine*, a Chickweed, *Chrysosplenium* (very pale), and an *Epilobium*. On the walls were *Marchantia*, *Asplenium Trichomanes*, *A. marinum*, *A. Adiantum-nigrum*, *A. Ruta-muraria*, and *Scolopendrium*.

(8) Fresh-water Aquatic.

There are two small lochans on the island. One, Loch Braig, is shown on the Ordnance Map: the other is not, although it is indicated on the Admiralty Chart. The second lochan was mapped and located by this expedition, and is for the present purpose named the Wester Loch. Both are situated in moory hollows, the Wester Loch at a higher elevation than Loch Braig.

Both are characterised by well-developed closed associations of *Arundo Phragmites* round the whole margins. This association is practically pure, only invaded by a few plants of *Scirpus lacustris*, *Sparganium minimum*, and at the outer margin, *Menyanthes trifoliata* and *Ranunculus Flammula*.

The floating-leaved association is pure *Nymphæa alba*, replaced for a few square yards in the centre by *Potamogeton*. Only a small portion of the centre of the loch was open water.

The bottom was muddy and the water drained out slowly by an outlet at the north-west corner. At the edges of this outlet were found *Ceratophyllum demersum*, *Utricularia minor*, *Nitella* sp., while fruiting *Chara* was present in abundance in the outlet stream.

(9) Zonation of Sea-weeds.

The rocks at Big Harbour, Caol Rona, an inlet on the north-east coast, and at Dry Harbour showed similar zonation (Plate VI).

	Occupying about
(i) *Pelvetia canaliculata*	3-4 feet
(ii) *Fucus spiralis* (some *F. vesiculosus*) . . .	5-6 „
(iii) *Ascophyllum nodosum* (individual plants 2 feet long) .	18-20 „
(iv) *Enteromorpha* spp.	6 „
(v) *Fucus serratus*, with a little *Ulva*	2-3 „
(vi) *Laminaria digitata* (3 feet plants) with much *Leathesia* and some *Furcellaria* on it	15 „

Where the rocks go straight down into the sea, the Laminarians are almost entirely replaced by *Himanthalia lorea*, with *Porphyra umbilicalis* growing between. *Chorda filum* grows below the tide-mark. The seaweeds will be referred to again below.

(10) Wood.

Natural woodland is non-existent on the island to-day, although according to the crofters a thick wood, "where the cattle lost themselves," used to surround Loch Braig; this wood is now represented by a few small birches. Scrub birch, isolated *Populus tremula*, *Alnus glutinosa*, *Pyrus aucuparia* (mostly in the gullies), a few willows by the schoolhouse at Dry Harbour, Hazel, Bramble and Ivy indicate that deciduous woodland once occupied a more prominent feature of the landscape.

The remains of a Pine wood, with stumps indicating at least 150-year-old trees, was found towards the south end of the island, but it was impossible to tell by inspection whether this wood was natural or planted, and this was also outside the range of knowledge of the crofters. The ground between the stumps is now peat-bog, partially denuded, and baked hard and cracked when seen in July 1933.

B. VEGETATION AFFECTED BY HUMAN AGENCY.

(1) Woodland.

The almost complete denudation of the woodland on the island is quite typical of the improvident outlook of the earlier crofters. It is true that an attempt was made, some sixty years ago, to replant woodland, and the only wood now standing on the island (on the north side of Big

Harbour) is a result of this attempt. The wood occupies a steep slope facing south-west, and trees are growing right down to the upper edge of the salt-marsh strip. The trees noted were the following: *Betula alba*, *Acer Pseudo-platanus*, *Quercus Robur*, *Fagus sylvatica*, *Cratægus oxyacantha*, *Tilia europea*, *Ulmus montana*, *Fraxinus excelsior*, *Pyrus Aucuparia*, *Larix europea*, *Corylus Avellana*. Undergrowth included Honeysuckle, Ivy, Bramble, with *Poa nemorosa*, *Luzula sylvatica*, *Teucrium Scorodonia*, *Scilla non-scripta*, *Blechnum Spicant*, *Pteris aquilina*, *Galium saxatile*, *Oxalis Acetosella*, *Potentilla erecta*, *Primula acaulis* and *Primula veris*, *Viola* sp., and a good admixture of heather. The trees were very much wind-pruned, especially on the north-east corner of the wood, and none was more than 30 to 35 feet high. Although originally a planted wood, it was obvious that no proper attention had been given it since planting. The trees were unthinned and unpruned, and many showed attacks of *Fomes* (see Plate VII, *A*).

(2) Arable (abandoned).

As indicated above, the arable land on Rona once amounted to about 133 acres (see Map, Fig. 4). Of forty-one fields marked on the Survey map, the writer was able to identify thirty-six: of these, thirty-three had reverted completely to an almost pure society of *Juncus communis*, two had become lowland marsh or wet meadow, and one had gone over to rough wild grasses. Depending upon the elevation, the *Juncus* community was mingled with moorland or meadow plants, but the general appearance was quite characteristic (Plate V). A typical portion showed the following:—

Juncus communis—dominant
Agrostis
Aira
Arrhenatherum—abundant
Festuca
Holcus
Equisetum sylvaticum—frequent
Angelica sylvestris
Cardamine pratensis
Crepis capillaris
Orchis latifolia
Prunella vulgaris
Ranunculus Flammula
R. repens
Scabiosa Succisa
Scutellaria galericulata
Spiræa Ulmaria
Veronica Chamædrys.

One of the more recently abandoned fields near the schoolhouse showed the following :—

Bartsia Odontites
Bromus mollis
Cerastium vulgatum
Gnaphalium sylvaticum
Matricaria inodora
Polygonum aviculare
Potentilla Anserina
Rumex Acetosa
Rumex pratensis
Senecio vulgaris
Senecio jacobæa
Stellaria graminea
Stellaria media
Vicia Cracca.

(3) Thatch.

The roofs of the crofts were thatched with heather, bracken and rush. Few of the crofts at Dry Harbour retained their roofs, and such as were in position were being colonised by *Rumex Acetosa*, followed by *Holcus lanatus* (with a little *Agrostis*). One cottage in particular had almost a full example of moor flora rampant upon it, including *Calluna*, *Erica*, and a large plant of *Athyrium filix-fœmina.*

(4) Peat Cuttings.

These have been described above.

(5) "Sea-weed Farm."

A most peculiar arrangement was discovered at Dry Harbour, and confirmed by reference to the crofters. This can only be described as a "sea-weed farm." The importance of the sea-flora for the inhabitants of Rona will be appreciated when it is remembered that the steep and barren rocks of the island made it impossible to maintain enough cattle to provide fertiliser for the fields. The only source of manure was the "Black weed" (*Fucus*), and the "Brown tangle" (*Ascophyllum nodosum*, and to a lesser extent *Laminaria*). The weeds were raked in, carted up in creels on men's backs, and built up in piles and ridges to decay. In the case of potato cultivation, the weed was drawn into ridges, and when half-rotted the potato tubers were buried in the weed and the whole earthed-up. To encourage the growth of weed in accessible places, stones about the size of a man's head were laid down on the floor

of Dry Harbour. These stones were covered with a rich growth of *Ascophyllum*. In particular, one shallow creek leading out of Dry Harbour had these stones laid in parallel, curved lines running 10 to 12 feet out from the tide-mark. At first it was thought that they were meant for the berthing of the fishing boats or the drying of the nets, but the real purpose is far more interesting, as an example of human ingenuity in the face of difficulties.

(6) Various.

(a) *Submerged Forest at Dry Harbour.*

Under about 15 inches of sludge well-preserved remains of wood and nut-shells (Hazel) were found. The wood appeared to be Hazel and Alder, but the species are awaiting specialist confirmation.

(b) *Wells.*

The two wells marked on the Survey were located. They were fed by springs, and walled-in with slabs of stone on three sides and above. The one nearest the camp, although within 20 feet of the high tide-mark, was not in the least brackish.

(c) *Tertiary Intrusions.*

Several Tertiary intrusions into the Lewisian gneiss were located. One of the largest, running right across Dry Harbour in a N.W.-S.E. direction, formed at one end a col between Meall Acairseid and another small summit to the north-east. In the gully thus formed the flora is quite luxuriant. The top of the col is typical upland marsh with *Erica Tetralix*, *Agrostis*, *Festuca ovina* var. *vivipara*, *Triodia*, *Molinia*, *Narthecium*, *Carices*, *Eriophorum vaginatum*, etc. A ditch by the path yielded *Aspidium*, *Blechnum*, *Polytrichum*, *Equisetum sylvaticum* and *E. palustre*. The sides of the gully were clothed with Birch, Rowan, Poplar; Ivy, Honeysuckle, Brambles; undergrowth of *Calluna*, *Pteris*, *Athyrium*, *Luzula sylvestris*, *Scilla*, *Oxalis*, *Viola*, etc. The Tertiary

intrusion crossed the floor of Dry Harbour and ended in a clearly defined boss of rock. The line of weakness between this and the gneiss had on one side become a sea-lane with a shingle-covered floor.

There does not appear to be much difference in the flora developed on the gneiss and on the Tertiary intrusions, the only striking point being the apparent dominance of *Calluna* on the one and *Erica Tetralix* on the other.

The following Willows and Sedges were found on the island:—*Salix repens*, various forms; *S. cinerea*, *S. aurita*, *S. aurita* × *repens*, *Blysmus compressus*, *Carex ampullacea*, *C. caespitosa*, *C. distans*, *C. dioica*, *C. flava*, *C. glauca*, *C. Goodenovii*, *C. ovalis*, *C. panicea*, *C. pulicaris*, *C. vulpina*.

The writer is indebted to Professor J. W. Heslop Harrison, F.R.S., Armstrong College, Newcastle-on-Tyne, for naming the Willows, and to Captain John Anthony, M.C., Royal Botanic Garden, Edinburgh, for much help in naming the other plants collected.

(*To be continued.*)

NOTES

Lepidoptera at Noss Head Lighthouse, Wick.—In June of last year (1933) I saw the Humming-Bird Hawk-Moth on two successive days. The Painted Lady and the Red Admiral butterflies were very numerous here also.—J. Bain, Noss Head Lighthouse.

John Dory (*Zeus faber*) in Glenelg Bay, Inverness-shire.—The chief habitat of this fish is in the Mediterranean and Atlantic. It is common on the southern coasts of Britain, but becomes rarer in the north and only rare stragglers reach the Norwegian coast. A specimen measuring $15\frac{3}{4}$ inches in length was taken in the middle of June 1934 in Glenelg Bay, Kyle of Lochalsh, and forwarded to the Museum by Mr C. H. M. Arnott, Glenelg.—A. C. Stephen, Edinburgh.

White-beaked Dolphin (*Lagenorhynchus albirostris*) stranded in Aberdeenshire.—A specimen of this species, measuring 9 feet in length, was stranded on the 29th July 1934 at a point in Strathbeg Bay about $1\frac{1}{2}$ miles north of Rattray Head Lighthouse. This Dolphin occurs not uncommonly on our coasts, more especially in the North Sea.—A. C. Stephen, Edinburgh.

Some County Records of Birds.—Our smallest county, Clackmannan, has been somewhat neglected in the birds recorded as occurring therein. We can find no previous records of the following species, which we found nesting there this year, 1934. We found the Lesser Redpoll breeding in a copse not far from Gartmorn Dam. It seems absurd that the Meadow Pipit should not have been recorded; it breeds commonly both on the Ochils and the low ground. The Sedge Warbler was nesting beside Gartmorn Dam.

On Gartmorn Dam we saw a good many Pochard in February and three in July, but found neither eggs nor young. Tufted Duck nest there, we saw more than one brood of young, and Little Grebes breed in some numbers, as do Moorhens. Black-headed and Herring Gulls, both old and young, frequented the loch in July. Records for West Lothian are a Purple Sandpiper and a Black-tailed Godwit, both found dead by us at Blackness.

Two immature Eider seen by us at Golspie on 22nd June are the first record of this species in south-east Sutherland.—Leonora Jeffrey Rintoul and Evelyn V. Baxter, Upper Largo.

BIRD NOTES FROM NOSS HEAD LIGHTHOUSE, WICK.

By John Bain.

THE following notes on the bird-life of this northern station may be of interest to readers of the SCOTTISH NATURALIST.

In the last week of March a telephone linesman had to clear four Rooks' nests from a telephone pole in the centre of the town. The pole had six double cross bars, which made an excellent foundation for the nests. The nests looked bulky enough from below, but when the material was gathered together in the lane below, the bulk was truly amazing. One of the Rooks had the courage to return and commence nest-building again. It has been left to carry on, and the young left the nest two days ago. On the 7th April a severe snow-storm occurred and numbers of migrants were on passage. In the forenoon it was wind and rain, which turned to snow about mid-day. Quite a number of Gold-crests, Robins, Accentors, Thrushes, Blackbirds, Fieldfare, and Redwings were sheltering around the station walls, and during the afternoon with the snow, many Lapwings, which were nesting on the heather and ploughed land at the back of the Lighthouse, came about the station for shelter. About three hours after the snow started, a Dipper circled overhead several times, then landed at the small pond outside the gate. This is the first Dipper I have seen on migration, but perhaps it might only have come from Wick river and got lost with the snow, visibility at the time being about 500 yards. At 5 o'clock, when I was in the engine-room, as it was getting dusk, a Willow-Warbler flew in through the open door into one of the windows. When I went for a closer view of it, it left the window and alighted on a receiver valve, and cocked its head this way and that as if inspecting the premises before it departed the way it came in. What amazed me was how it stood the din of the two engines running. The warmth certainly would be to its liking, but the noise did not appear to annoy it in any way. I expect the fumes of the paraffin proved too much for it. It remained in the engine-room nine minutes.

Next day was heavy rain with wind of gale force, and during a turn round the walls I saw a Grey Shrike. It is well called the "sentinel"—a handsome bird, even in a downpour of rain as when I saw it. On succeeding days I searched the Head for another sight of him, stormy days they were too, and was fortunate enough to get a longer and better view of him (on the 13th) than before, and in bright sunshine.

On the 29th April, while having a look through some tidal caves to the west of the Lighthouse, most of which had Rock Doves' nests, of the few I could reach, some had eggs but the biggest percentage had well-fledged young.

The most interesting incident of the ramble was the sight of a stoat *eating* a Fulmar. I noticed the stoat and Fulmar on the steep grassy slope at the top of the 70-feet cliff after I came out of a cave. The Fulmar was dead when I noticed them, and the stoat was busily feeding on it. After about ten minutes the Fulmar fell over the edge, and the stoat went along the grassy faces hunting as keen as though it still had an appetite. On examination, half of one breast of the Fulmar was eaten, the back was well smeared with oil, but no wound was on the throat. I think the stoat must have attacked the bird below the wing.

I have seen other four Fulmars dead on these slopes, at or near the selected nesting site, and am wondering if that particular stoat has acquired a taste for Fulmars!

Although the weather was very cold and stormy during April and May—it could quite well be called wintry—nesting appears to be normal. The first eggs to be observed were: Ravens, 5 eggs on 11th March; Lapwing, 1 on 1st April; Rock Dove, 2 on 16th April; Ring Plover, 4 on 27th April; Partridge, 5 on 3rd May; Herring Gull, 1 on 3rd May; Rock Pipit, 3 on 9th May; Twite, 5 on 16th May; Jackdaw, 4 on 9th May; Razorbill, 1 on 16th May; Snipe, 4 on 16th May; Guillemot, 1 on 20th May; Fulmar, 1 on 20th May; Stonechat, well-fledged young on 25th May; Wheatear, 5 on 25th May; Kittiwake, 1 on 28th May.

Yesterday, 3rd June, I saw a Fieldfare, which is rather a surprising date.

WADERS THROUGHOUT THE YEAR ON THE COAST OF AYR.

By E. Richmond Paton, B.A. (Cantab.), F.Z.S., M.B.O.U.

In order to find out the status of Limicolæ on the tideways of Ayrshire, monthly or bi-monthly visits were made over a period of twelve months. Barassie shore was chosen as the most accessible and presenting the most varied condition of ground: rock, sand, and mud. In the north harbour of Troon a sewage pipe is led into the bay, while at the north end of the beat, about a mile and a half distant, there is a good stretch of sand and a cluster of rock.

Rather than give a detailed description of each bird, the tabulated list which follows shows, I think, at a glance the varying numbers of the species seen throughout the season. The larger numbers estimated are only approximate.

It will be noted that the Greenshank was seen in four of the winter months; no visit was possible, unfortunately, in November. I had previously known the bird as a passage migrant only. The same applies to the Bar-tailed Godwit; its cousin, the Black Tail, was hoped for but not seen; the only two records for the county thus remain unaugmented at present. The Little Stint was another to be expected, while the Knot was more plentiful on this part of the coast than I had hoped for; the Sanderling's appearance was confined to the warmer months.

I was pleased to find the Grey Plover on two occasions though possibly the same bird. The record of the Purple Sandpipers was encouraging; they were very tame, as is usual; immature, I should say, and they uttered a low subdued twitter when on the wing. The Sanderlings seen in May were in every phase of plumage. While I have frequent records of Whimbrel from Hareshawmuir in May and September, none was seen throughout the season on the shore; this was unexpected.*

It might be added that it is very difficult to make observations during the holiday months, as the shore is much frequented by trippers.

The result of this year's observation confirms to a great extent what we already know of the status of the waders in this county, but it has brought out the position of such as Godwit, Greenshank and Knot in a new light.

* One seen, 7th October 1934.

WADERS THROUGHOUT THE YEAR ON BARASSIE SHORE. 1933/4.

	Knot.	Godwit.	Green-shank.	Golden Plover.	Pewit.	Snipe.	Purple Sand-piper.	Sander-ling.	Ring Plover.	Red-shank.	Turn-stone.	Grey Plover.	Dunlin.	Curlew.	Oyster Catcher.
1933															
Sept. 22	ns	5	5	ns	ns	ns	...	...	...	c	many	...	ns	ns	
„ 26	ns	15	9	ns	ns	ns	...	...	many	c	20/30	1	c	ns	
„ 27	4	12	4	ns	ns	ns	...	...	several	c	„	0	c	ns	
Oct. 8	5/6	50	6	1000	500	3	...	...	ns	c	„	0	ns	ns	
„ 11	12	50/60	6/8	ns	lot	ns	...	...	many	c	less	1	lot	lot	
„ 30	2/3	„	8	ns	ns	ns	...	...	„	c	12	0	increase	ns	
Dec. 17	ns	80	ns	ns	few	ns	7	...	few	c	12/15	0	200/300	odd 1	common.
1934															
Jan. 23	ns	2/3 doz.	ns	ns	ns	ns	...	...	ns	100s	a few	0	100s	few	
Feb. 25	40/50	decrease	2/3	ns	ns	ns	...	...	a few	100s	lot	0	100s	100s	
Mar. 31	ns	1	1	...	...	...	...	...	...	c	few	...	?	lots	
Apr. 30	ns	30	ns	ns	ns	ns	...	6	30/40	c	12/15	...	20/30	few	
May 10	ns	12	ns	ns	few	ns	...	100	100/150	ns	ns	...	100s	many	25
„ 27	ns	ns	ns	ns	ns	ns	...	20/30	50/60	...	...	...	50/60	20/30 12/13	12/15
June 10	ns	ns	ns	ns	ns	ns	...	ns	ns	ns	ns	...	ns	ns	12/15
Sept. 2	5/6	15/20	3/4	1	...	...	...	20/30	30/40	c	20/30	...	lot	30/40	c

14.v.33. 20/25.

c = common. ns = not seen.

INCREASING BIRDS IN NORTH UIST.

By George Beveridge.

It is pleasant to be able to record that some breeding birds are increasing. In North Uist the Starling (*Sturnus vulgaris*), the Corncrake (*Crex crex*), Eider Duck (*Somateria mollissima*), the Lesser Tern (*Sterna minuta*), and the Dunlin (*Erolia alpina*) have all become more plentiful in recent years. The Starling alone is unwelcome. It is unnecessary here to state all the reasons why it should not be encouraged, but it has much to answer for here in the matter of driving out the Rock Pigeon from the caves around this Island. As I write there are close on a thousand Starlings roosting in a reed-bed a few hundred yards from where I write, and at daybreak they swarm to the houses and cause endless annoyance by over-balancing themselves and so falling down the chimneys. Twenty-five years ago the Starling was comparatively scarce here. I would say that the Corncrake is breeding in double the number it did ten years ago. On 10th July I found eight pairs of Lesser Terns in an area of not more than 20 acres (they were at the west end of the Island of Vallay), and I had seen several pairs in the centre of the Island immediately preceding this. In former years a couple of pairs would cover the whole area mentioned. The Eider has increased to a marked degree. It is nesting both in the low ground and on the hill, in some cases at a considerable distance from the shore. A few years ago I met a mother with her four ducklings on the "ford" at low water; she was obviously bringing them from the hill to the water and the tide being low she had a considerable journey on the strand before she could get them to the sea. This year (1934) on 3rd June I found two Eiders' nests each containing five eggs. There was down in both nests. Between 3rd June and 27th June I found 21 Eiders' nests containing eggs, the number in each nest varying from three to five eggs and this in Vallay Island alone, and not taking into account those on the hill or the small islands in the Channel dividing Vallay from the mainland of North Uist.

The record of the Dunlin during the last twenty years is somewhat interesting. In the years before the War this wader went in large flocks—sometimes a hundred or more together. In 1917 the Dunlin had decreased very much in numbers and was found only in small bunches and for a time thereafter bred but sparingly. During the last five years it has been increasing steadily and this year there are a larger number breeding than even before the War. But though they are breeding in larger numbers they are not seen in flocks of a hundred as in former years. They now go in companies of twenty or so.

NOTES

Little Bunting in South Fife.—On 12th April 1934, after a prolonged period of north-easterly and easterly gales, I saw a Little Bunting on the railway bank near Lower Largo. My attention was first attracted by its note, which I had heard before on the Isle of May, and as I had a very good view of the bird I have no doubt as to its identity. This is the first record for the mainland of Scotland but it has been reported from a good many of the islands. —Leonora Jeffrey Rintoul, Upper Largo.

Late Nesting of Green Plover in North Uist. —On 4th August 1934, a Green Plover was flushed from her nest, which contained four eggs. The nest was close to the shore on the mainland of North Uist opposite the Island of Vallay.—George Beveridge, Vallay, Lochmaddy, N. Uist.

Barn Owl Nesting in a Sea Cave in the Outer Hebrides. —In a sea cave on Islay, Inner Hebrides, I found a Barn Owl's nest, which was in a crevice in a dark corner; both birds flew out and perched on a rock at the entrance to the cave. It was early in June and no eggs had yet been laid.—P. W. Sandeman, Edinburgh.

Sand-Martin Nesting in Inner Hebrides. — In Islay I found a Sand-Martin's nest on the banks of the Machrie burn, and also saw two to three pairs flying about. I think this is the first nesting record for the Inner Hebrides.—P. W. Sandeman, Edinburgh.

***Sinodendron cylindricum*, a rare Lamellicorn Beetle in Peeblesshire.**—It is interesting to be able to record the presence of *Sinodendron cylindricum* in this county, where my son and I found it on 16th or 17th June in a decayed stump on the south bank of the Tweed near Stobo. This species is the only one of the small family of *Lucanidæ* (comprised, in Britain, of the three genera *Sinodendron*, *Lucanus*—the well-known Stag Beetle—and *Dorcus*, each containing only one species) known to inhabit Scotland, where, according to Joy, it has so far only been recorded from "Scot., 4"—East Highlands, Tay, Dee, Moray and Sutherland areas.—D. K. Kevan, Edinburgh.

[We have records of this beetle from the counties of Peebles, Perth, Aberdeen, Inverness, Elgin, and Sutherland.—Eds.]

Rabbit-hole below High-water Mark in North Uist.—The following incidents may not be without interest. On 31st July 1932 I found a rabbit-hole below high-water mark in a sandy bay. The length of the hole was eight feet and there was one entrance only. I had never seen a rabbit-hole in such a position before, and now nearly two years later, on 19th July 1934, I have found a similar occurrence; this time the hole has three entrances and is below high-water mark, but in a different bay about one mile distant from the first and on the opposite side of the island. On both occasions the holes were found when the tides were slack or at neap tide so that the tide at that time would not quite reach them. The soil of the island is sandy and in hot weather in July the heat is considerable. Perhaps the rabbit found a burrow in the wet sand cooler than on land.—George Beveridge, Vallay.

Occurrence of Barn Owl in Peeblesshire.—During June an Owl had been doing considerable damage among the young pheasants at Dawyck, and was ultimately shot on 29th June. Unfortunately it turned out to be an adult Barn Owl, which is not common in this county, the last recorded occurrence being in 1926, so this occurrence is perhaps worth recording.—F. R. S. Balfour, Dawyck, Peeblesshire.

Great Crested Grebes in the Firth of Forth.—On the 30th August we saw a large flock of about 180 Great Crested Grebes between Granton and Cramond. It would be interesting to know where these birds come from.—D. Q. Sandeman and P. W. Sandeman, Edinburgh.

Woodwasps (*Sirex* spp.) in N. Aberdeenshire.—Amongst many specimens of *Sirex* received for identification, generally from localities whence they have already been recorded, are two species which fill a blank in the records from the North-East of Scotland. On 18th September I received from Mr Alex. Smith, M.A., a large female specimen of *Sirex cyaneus* caught in a house at Woodend Forgue, some six miles north-east of Huntly. Another specimen was caught at Kinnoir nearer to Huntly. This blue-black Woodwasp is clearly much the rarer of the two Scottish species in this district, for I have seen several specimens of *Sirex gigas* caught in the parish of Forgue. The district is in North Aberdeenshire, from which neither of the two species is recorded in Mr William Evans' account of the Scottish distribution (Scot. Nat., 1922, p. 182).—James Ritchie, University of Aberdeen.

Mottled Hairworm (*Gordius villoti*) in Inverness-shire.—Accurate records of the distribution in Scotland of the various species of Hairworms are still very scarce, so that I would record the presence of *Gordius villoti* (Rosa) in Inverness-shire. The specimen is a male, found alive in a pool of rain-water on the hills near Moniack Bridge, Kirkhill, on 12th August 1934. The characteristics of the species are described in an earlier paper (Scot. Nat., 1915, p. 258). This is the first record of an identified species of Hairworm from Inverness-shire; the nearest place at which this particular species has been found is Nairn.—James Ritchie, University of Aberdeen.

Autumn Migrants at Cobbinshaw Loch, Midlothian.—At Cobbinshaw Loch on 10th September I found amongst other waders, Ruffs, four or five Knots, and a solitary Bar-tailed Godwit. The Ruffs were not wild, and, standing a few paces away, I watched two of them along with a Knot feeding on the soft mud at the water's edge, and had ample time to note the beautifully patterned back, the long slender tarsus, and the shapely, decurved bill. One bird was much larger than the Knot, the other, if anything, smaller—though of course standing higher. The smaller bird was no doubt a female. The larger bird had flesh-coloured legs, the smaller, olive-green legs.

In the marsh at the west end of the Loch I almost trod on a Short-eared Owl. It rose hastily and swooped back at my head with a harsh "choo-uck," then made off, only to settle almost at once on a paling stob, and finally began to quarter the marsh in wide circles.

On 12th September my father and I visited the Loch, and noted in addition to the above waders, a flock of fifteen Curlew-Sandpipers and a single Little Stint. The Stint was very tame. In flight it exhibited a faint white wing bar and the outer tail feathers were not white. The Curlew-Sandpipers were resting alongside a small flock of Dunlins. The birds were loath to rise, and in perfect conditions of light we compared the two species alongside each other in one field of the glasses. When the Curlew-Sandpipers rose, the white upper tail-coverts were conspicuous. — WILLIAM SERLE, Junior, Duddingston, Edinburgh.

The Ectoparasites of British Birds and Mammals. (An Appeal.)—In connection with a projected survey of the ecto-parasitic arthropoda of British birds and mammals, may I appeal to readers for material of any of the following groups:—

(1) Anoplura (*Siphunculata* and *Mallophaga*). Biting and sucking lice.
(2) Siphonaptera. Fleas.
(3) Diptera-Pupipara (*Hippoboscidæ* and *Nycteribiidæ*). Sheep-keds, cattle-flies, bird-flies, bat-flies and deer-flies.
(4) Hemiptera (*Cimicidæ*). Bat-bugs and bird-bugs.
(5) Coleoptera (*Leptinidæ*). A small beetle said to be parasitic on small mammals.
(6) Acarina (*Ixodoidea*, *Sarcoptoidea*, etc.). Ticks, skin, and feather mites, etc.

Every part of the bird, bat, or other mammal, should be carefully examined, viz., the fur or feathers (especially the quills), the ears, the legs, the tail and the body, and a note made of the position of the parasite on its host. Nests of birds and mammals should also be examined. All the parasites from a single host may be placed in a tube of roughly 70 per cent. alcohol together with the following data:—Name of the host (common and scientific), locality, date, collector's name, etc.

Material should be sent to the undersigned, who may be able in special circumstances to forward tubes for collecting to anyone who will be kind enough to help.

GORDON B. THOMPSON, Department of Entomology, British Museum (Natural History), Cromwell Road, London, S.W.7.

The Peacock Butterfly.—I would be grateful for information about the distribution of the Peacock Butterfly (*Vanessa Io*) in the northern part of Great Britain. Until quite recently, the only instance known to me of the occurrence of this species in Galloway

was that recorded in the SCOTTISH NATURALIST for March-April 1934 by Mr J. G. Gordon, who watched one on a roadside wall near his residence at Corsemalzie on 5th September 1898. Desiring if possible to establish this beautiful butterfly in this neighbourhood I purchased about thirty chrysalids in the spring of 1931 and released the perfect insects in the garden here in June of that year. I saw no more of them after that summer, which was cold and wet; nor did I hear of any being seen in this district until 22nd August 1933, when Miss Harriet and Mr Maclean watched a fine specimen among a number of Red Admirals in the garden of Jonderghie, distant about seven miles direct from the garden here.

During the present year, however, I have received reports from trustworthy observers of several Peacock Butterflies. Mr J. G. Gordon saw a fine specimen at Corsemalzie on 13th August, and another somewhat tattered one on the 30th. In Mr M'Douall's garden at Logan, about thirty miles distant from Corsemalzie, two Peacocks were frequently seen, and others later in the season. Lastly, two or more have been seen at different times in Lady Charles Kennedy's garden at Hensol, near New Galloway, full thirty miles direct to the east of this place.

I have watched carefully here without seeing a Peacock; but my daughter Mrs Graham, a trustworthy witness, reported having seen one among two or three Red Admirals in the garden here in the last week of August.

It would be very gratifying to find that *Vanessa Io* has become established in this district. We grow plenty of nettles here for the nurture of their caterpillars!

Red Admirals (*Vanessa atalanta*) are not nearly so numerous in this district as they were last year.—HERBERT MAXWELL, Monreith.

BOOK NOTICES

Sea Terns or Sea Swallows: their habits, language, arrival and departure. By GEORGE MARPLES, A.R.E., A.R.C.A., M.B.O.U., and ANNE MARPLES. Illustrated with photographs, drawings and diagrams by the authors. London: Country Life Limited, 1934, crown 4to, 227 pages. Price 15s. net. This delightful volume is the result of many years of patient observation on the part of its gifted authors. Every phase in the life of these beautiful birds has been carefully and exhaustively studied, and we are now presented with a more complete history of British Terns than has ever before been possible. The exquisite photographs, over one hundred in number, and the many

excellent diagrams and drawings, added to a beautifully printed text, render this book one of the most charming ornithological gift-books imaginable. But it is not only a gift-book—it is a thoroughly scientific study of a fascinating group of birds, which every naturalist should read carefully. All the activities of Terns are described in the fullest detail, even their footprints and their vocabulary! We should imagine that this book will remain the standard work on the subject for many years, and its exceedingly moderate price should secure for it a place in the library of every student of bird-life.

Our Garden Birds: their food, habits and appearances. By H. MORTIMER BATTEN. London and Edinburgh: T. Nelson & Sons, Ltd., T. C. and E. C. Jack Ltd. (no date), 8vo, 191 pages and 39 coloured plates. Price 5s. The avowed object of this book is to encourage a more general interest in the birds which frequent our gardens, and to induce a more extended use of feeding devices and nesting-boxes by all those who have a large enough garden for the purpose. Each species of bird is dealt with separately, in simple language, but there does not seem to be any special significance in the sequence of treatment. The robin comes first, and the garden warbler last, and between these nearly forty species in random order. Each bird is briefly described after an account of its habits, and illustrated by a coloured plate. These plates have been published before in a work of larger *format*, and we regret to see that in the present volume it has been necessary to cut them down. In this process many of them have been spoiled, the tails of the birds having been cut off to fit into the page. We trust that the original blocks have not been thus mutilated, for the work in which they were originally used was, in our opinion, one of the most useful single-volume reference books on British Birds ever published.

The Field-Club Flora of the Lothians. By the BOTANICAL COMMITTEE of the Edinburgh Natural History Society. Edited by ISA H. MARTIN, M.A., F.L.S. With descriptions, keys, ecological lists, illustrated glossary, and map of the Lothians. Edinburgh and London: William Blackwood & Sons Ltd., 1934, size $6\frac{1}{4}$ in. × 4 in. × $\frac{3}{4}$ in., 318 pages. Price 5s. This excellent little book, which can easily be carried in the pocket, will be enthusiastically welcomed by all botanists, amateur as well as professional, in the Lothians and other parts of Scotland. Although dealing essentially with the flora of the three counties named in its title we have no hesitation in saying that it may with advantage be consulted in any part of Scotland, or we might go so far as to say, in any part of the British Islands. For it is not merely a list of names of plants with localities appended. Every species is described concisely and accurately, so that any one who carries it, in whatever part of Britain he may happen to be, may identify any plant which has a fairly general distribution. The resident in, or the visitor to, the Lothians has the additional advantage of a list of localities where

he may be likely to come across the rarer or more local species. There are, in addition to the descriptive portion of the work, several sections of general interest, including a key to the natural orders and keys to the genera, a number of ecological lists, an excellent glossary illustrated by numerous figures, indices to natural orders, genera and common names, and lastly a clearly-printed map of the Lothians indicating all the places mentioned in the Flora. We can heartily recommend this book as a valuable companion for anyone walking through the delightful country which surrounds our Scottish capital. It should form an excellent introduction to the study of field botany, and we trust it will have such a sale as it deserves and be the means of inducing many a young person to take up the study of our native flora.

Report on Cetacea stranded on the British Coasts from 1927 to 1932. By F. C. FRASER, B.Sc. London: British Museum (Natural History), 1934, 4to, 41 pages, with 8 text-figures and 6 maps. Price 5s. This valuable publication follows closely upon the lines of the previous Report prepared by Sir S. F. Harmer and published in 1927. The present Report commences with a list, arranged in chronological order, of the Cetacea stranded during the six years concerned. In this list, printed in tabular form, the date, locality, county, length, scientific name of species, and evidence of determination are given in full, and this is followed by a short table showing the comparative frequencies of the species. In the succeeding pages is a systematic account of all the British species, and this is illustrated by several excellent figures. In this section of the Report one finds full details of the specimens stranded during the period dealt with, while on pp. 40 and 41 an extremely useful key is given for the determination of all the British whales and dolphins. An excellent feature of the Report is the series of full-page maps, on which are indicated the exact locality, date and length of every specimen recorded in the text. This Report has evidently been prepared with great care, and it forms an invaluable and indispensable contribution to our knowledge of the wanderings of Cetaceans in the waters which surround the British Isles.

The South-Eastern Naturalist and Antiquary. London: 1933. This volume, running to 119 pages, with a plate, 2 figures and a map, includes, besides an interesting summary of sectional reports, a full account of the proceedings at the 38th Annual Congress held at Norwich in June 1933. Many of the papers read at the Congress are printed in full, and among them the following should appeal to our readers: the Presidential Address by Professor E. J. Salisbury on "The Influence of Man on Vegetation"; "The Mycetozoa," by H. J. Howard; the Insect Immigration Reports on pp. 51-53; "Application of the Spectroscope to Biology" by Hugh Ramage; "Pond-Life: Rotifera and Polyzoa in Norfolk Broads," by H. E. Hurrell; and "Birds of the Broads," by Major Anthony Buxton. The price of this publication is 5s. to non-members.

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NOTE.—*No attempt is made to index in detail the species mentioned throughout articles.*

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